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Basic Skills, Soft Skills and Labour Market Outcomes: Secondary Analysis of the National Child Development Study

Stephen Machin, Steven McIntosh, Anna Vignoles and Tarja Viitanen

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Executive Summary

This work on the connections between basic skills and individuals' labour market outcomes originates from the recent report by Sir Claus Moser (DfEE (1999)), which suggested that approximately 20% of adults in England have severe literacy difficulties, whilst around 40% have some numeracy problems. Moser suggested a National Strategy for Adult Basic Skills, with clear national targets to reduce the number of functionally illiterate and innumerate adults. To investigate the possible benefits of such a strategy, the Department for Education and Employment commissioned two reports, of which this is the second, to evaluate the economic impact of literacy and numeracy skills[2].

The first report into the impact of basic skills by the *Centre for the Economics of Education* (Dearden *et al*, 2000; McIntosh and Vignoles, 2000) showed that basic numeracy and literacy skills have important positive effects on individuals' labour market outcomes. This current report extends this work by considering the relations between labour market success or failure and what can be refereed to as their 'soft skills'. This is of potential importance as these 'soft' characteristics may well be correlated with numeracy and literacy skills, and so could explain some of the observed positive relationship between basic skills and labour market outcomes. Because of this, the primary purpose of the current analysis is to establish whether the substantial economic returns to basic literacy and numeracy identified in our previous report continue to be observed once the models used take full account of individuals' attitudes and 'soft skills'.

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Specifically, the previous CEE research (Dearden *et al*, 2000; McIntosh and Vignoles, 2000) found the following:

- Around 80% of UK adults have achieved Level 1 literacy skills, and 60% Level 1 in numeracy (British Skills Agency Standard). Moser (1999) suggested a target of 90% and 70% respectively by 2010.
- There is evidence of a large positive effect on earnings and employment rates from having better *numeracy* skills, specifically from achieving at least Level 1 skills, although there was also evidence of a large premium from acquiring just Entry Level numeracy skills. Not taking into account other factors that influence earnings, individuals with Level 1 numeracy skills earn around 15-19% more than those with skills below this level. Even after allowing for an independent effect from the worker's education/qualification level, and after controlling for family background, workers with Level 1 numeracy skills earn around 6-7% more than their less skilled peers.
- There is also evidence of a positive relationship between *literacy* and economic outcomes, although the results vary according to the data set used to evaluate the issue. With no controls, Level 1 literacy is associated with having 15% higher earnings (similar to the numeracy effect). Once other variables are added to the model the effect from Level 1 literacy is reduced to 1-3% in the NCDS data set but is still a sizeable 11% in the IALS data set.
- Better numeracy is also associated with higher employment rates. Specifically, individuals with Level 1 numeracy skills are around five percentage points more likely to be employed (not taking into account other factors). Even in the full model, which conditions for a person's education level, Level 1 numeracy skills are still associated with having a 2-3 percentage point higher probability of being in employment.
- Again, the literacy results differ according to the data set used. With no controls in the model, having Level 1 literacy skills is associated with a 5-percentage point higher probability of employment in the NCDS, and 13-percentage point higher probability in IALS.

[2] For the other report, see DfEE (2001, forthcoming).

Once all the controls are added, including education level, there is no effect from Level 1 literacy in NCDS but a 10-percentage point higher probability of employment from IALS.

This current report takes the analysis further by reformulating the effect of basic skills on outcomes as described above once one also takes into account individuals' attitudes and 'soft skills'. The attitudinal and soft skill variables include the following: attitudes to school and homework at age 16; school attendance at age 16; teachers' and parents' views of the individual's social skills and ability to interact with others at age 16; attitudes to life in general at age 16 and at age 37; each respondent's own assessment of their people skills; their ability to trust others; their tendency to argue; their attitudes to achievement; their need for control; and their caring skills.

The report adopts similar modelling techniques to Dearden *et al*, (2000), but additionally uses different models and variables to identify more clearly the impact of *improvements* in adult literacy and numeracy skills, as opposed to just identifying the effect of having a particular level of skill. Specifically, four different measures of skill improvement are used. Firstly, whether respondents have taken a basic literacy or numeracy course. Secondly, whether there have been real changes in respondents' literacy and numeracy test scores between the ages of 16 and 37 (although the tests at the two ages are not identical). A third measure is constructed by identifying individuals who start out with no qualifications (or just NVQ1) but who gain qualifications as adults. The last measure is simply whether the individual self-reports that they have improved their literacy or numeracy skills.

The results show:

- Literacy and numeracy skills display a larger, more robust, connection with individuals' outcomes than individual's attitudes, motivation or 'soft skills'.
- Better reading and mathematics skills at age 16 are strongly and significantly associated with reaching higher levels of educational qualifications, even when the individual's motivation and 'soft skills' at 16 are included in the model.
- Individuals with better reading and mathematics skills at age 16 have higher labour market earnings, and are more likely to be in work, even when one controls for the

person's attitudes and 'soft skills'. Much of this positive link with reading and numeracy skills operates via an indirect effect on individuals' qualification level. Nonetheless, there remains an independent positive relationship between literacy and numeracy and some labour market outcomes, even after allowing for individuals' attitudes and 'soft skills' and their eventual qualification level.

- For example, males in the top quintile of mathematics ability at age 16 have, taking no account of any other factors, a 6.6 percentage point higher probability of being employed than those in the bottom quintile. This is reduced only slightly, to 5.5 percentage points if 'soft skills' are added to the model, and to 4.8 percentage points if the person's qualification level is included. For women, reading is a more important determinant of employment, although the results are generally insignificant once the person's qualification level is added to the model.
- In terms of wages, males in the top quintile of reading ability at 16 earn 20% more than those in the bottom quintile. This wage premium is reduced only slightly to 18% once 'soft skills' are added to the model, but falls to just 7.4% once the person's qualification level is included. Still, this effect remains statistically significant, suggesting that there is an impact of age 16 reading skills on earnings that operates over and above the effect that such reading skills have on the acquisition of qualifications. Males in the top quintile in mathematics also earn 20% more than those in the bottom quintile. This premium is reduced to 18% if 'soft skills' are added to the model and to 4% (insignificant) if the person's qualification level is included.
- Most of the attitudinal variables and soft skill measures do not individually have a significant impact on individuals' outcomes.
- We also looked at the empirical connections between adult basic skills and the outcomes of interest. The adult basis skills were measured in terms of numeracy and literacy at age 37. Here the results were more mixed, and many of the variables insignificant, partly due to the small sample sizes.[3] The inclusion of the 'soft skill' variables and also the individual's qualification levels into the employment models generally rendered any positive relationship between adult basic skills and outcomes statistically insignificant. However, inclusion of the 'soft skill' variables did *not* eliminate all the relationships

[3] Note that in our adult skill equations, we condition for age 16 ability in reading and mathematics. Hence we are in effect attempting to measure the impact of moving up the skill distribution between age 16 and age 37.

found between adult numeracy and literacy and individuals' earnings, and some of the magnitudes of the estimated links seemed reasonably large.

- For example, males with Level 1 numeracy skills have a 4-percentage point higher probability of being employed. This effect is reduced to less than 2 percentage points and becomes statistically insignificant once the 'soft skill' variables are added to the model. However, males with Level 1 numeracy skills earn 9% more than those with skill levels below Level 1 and this result is not reduced or made insignificant by the inclusion of the 'soft skill' variables.
- Individuals who reported that their skills had *improved*, generally earned more than those who did not believe that their skill levels had improved. For example, males who claimed to have improved their numeracy skills earned 3% more than those who did not make such a claim. Women who claimed to have improved their numeracy skills earned a sizeable 11% more than those who made no such claim. Women who reported rising skills also had a higher probability of being employed.
- Most of the other skill improvement measures were insignificant in the model. However, males who move up the literacy skill distribution between the age of 16 and 37 (particularly those who start at the upper end of the distribution) do earn more, whilst those who improve their numeracy skills have a greater probability of being employed. Thus, when we concentrate, as above and in the Dearden *et al* (2000) report, on the wage effect of having *Level* 1 skills, relative to below this level, numeracy skills appear to have a greater effect on earnings than literacy skills. However, when we consider the *change* in skills between the ages of 16 and 37, literacy skills have a greater wage effect, for men at least, and if the male was initially at the upper end of the skills distribution at age 16. These two results together suggest that for adults with very low basic skills, improving their numeracy to at least Level 1will have a greater effect on earnings than improving their literacy, but that adults already with a good grounding in basic skills will see the greatest wage gains from further increasing their literacy rather than their numeracy skills. Thus, for numeracy the key seems to be to get skills to an acceptable level, while for literacy, the gains will go on rising as skills continue to be improved (at least for males).

1. Introduction

A recent report by Sir Claus Moser, investigating the basic skills of English adults (Department for Education and Employment (DfEE), 1999) suggested that basic literacy and numeracy is a significant problem for 20-40% of the population. Furthermore, the report showed that this basic 'skills gap' is one of the worst in Europe. Moser suggested a National Strategy for Adult Basic Skills, with clear and ambitious national targets to reduce the number of functionally illiterate and innumerate adults. To investigate the possible benefits of such a strategy, the DfEE commissioned research into the economic returns to having better literacy and numeracy skills. This research (Dearden *et al*, 2000; McIntosh and Vignoles, 2000), has shown that basic numeracy and literacy skills have important positive effects on individuals' labour market outcomes, particularly on their earnings and employment probabilities. However, a potential criticism of this work is that it does not fully allow for the attitudes and so-called 'soft skills' of different individuals. If individuals with better literacy and numeracy skills also have better 'soft skills', then some of the positive benefits of literacy and numeracy that were identified in the previous research may, in reality, be attributable to individuals having better 'soft skills'. Another limitation of this previous work is that, while it showed that those with better basic skills did better in the labour market, it only indirectly investigated whether *improving* adults' basic skills would also improve their labour market outcomes. This work aims to address these criticisms.

The literacy and numeracy measures used in the previous research on this topic (Dearden *et al*, 2000) were based on tests from two surveys; the National Child Development Study (NCDS) and the International Adult Literacy Survey (IALS). This research extends the analysis, using literacy and numeracy measures from the NCDS only, since the NCDS data are richer in detail and contain measures of 'soft skills' that are not available in IALS. Specifically, we investigate whether the literacy and numeracy test scores in the NCDS are correlated with other personal attributes/skills, that were excluded from the previous analysis, but that also have a positive effect on individuals' labour market outcomes. Examples of such attributes or 'soft skills' are individuals' ability to interact with other people, internal drive or motivation, and so on. We also

investigate whether individuals who have measurably improved their basic skills since the age of 16 earn more as a result of their higher skill levels.

2. Literacy and Numeracy in the UK

Full details of the state of adult literacy and numeracy in the UK can be found in the recent Moser report (DfEE, 1999; see also Dearden *et al*, (2000) and McIntosh and Vignoles, 2000). However, in summary, the Centre for Longitudinal Studies (for the Basic Skills Agency)[4] has found (as reported in Moser (DfEE, 1999)) that 6% of the adult working population have 'great difficulty with any reading, struggling to read the simplest and shortest texts …'[5]. Around 20% of adults '… may read slowly with little understanding …'.[6] In total around 20% of UK adults are below the standard set for 11-year-olds, as shown in Table 1 below.

Table 1. Literacy skills

QCA National Framework of qualifications level	Basic Skills Agency standards	Equivalent vocational qualifications	Equivalent levels in schools	Percentage of adults at this level (numeracy)	Percentage of adults at this level (literacy)
Below entry level	Below entry level	—		23	6
Entry level	Entry level	—	2 (age 7)	25	13
Foundation	Level 1	NVQ level 1	4 (age 11)	24	38
Intermediate	Level 2	NVQ level 2	GCSE A*–C (age 16)	27	43[a]

[a] Figure includes all those at level 2 or above.
Source: The Moser Report (DfEE, 1999).

As is also evident from Table 1, the situation with numeracy is more severe. 23% of adults have numeracy skills below entry level. More specifically, this means that nearly a quarter of adults cannot work out their change from £2 after buying three items, and around 50% of adults have only the numeracy skills expected of an 11-year-old .

[4] The CLS (Bynner and Parsons, 1997a and 1997b) used the National Child Development Study data, which we also use for this report.
[5] DfEE, 1999, p. 16.
[6] DfEE, 1999, p. 17.

The Moser Report (DfEE, 1999) recommended that the government set national targets, for 90% of adults to reach level 1 literacy and 70% to reach level 1 numeracy by the year 2010. Current achievement levels are about 80% and 60% respectively.

3. Summary of results from previous research: returns to literacy and numeracy skills

The main finding from the previous research is that there are large positive effect on earnings and employment rates from having better numeracy skills, specifically from achieving at least level 1 skills (although there was also evidence of a large premium from acquiring just entry level numeracy skills). There is also weaker and more mixed evidence of a positive relationship between literacy and labour market outcomes.

Table 2 below reproduces some of the key results from this previous research, which was based on both the NCDS and the IALS data sets. Individuals with level 1 numeracy skills have log(earnings) around 15–19% higher than those with skills below this level, not taking into account other characteristics that might impact on earnings.[7] The third column introduces controls for family background and education level. Thus if two individuals have identical family background and education, but one has numeracy skills at level 1,while the other's numeracy skills are below this level, then the one with level 1 skills will earn around 6-7% more than the other. The final column controls for initial ability at age 7, reading and mathematics *ability at 16* and education level, as well as family background, and gives an approximate, albeit indirect, estimate of the effect of moving an *adult* up the numeracy and literacy distribution. The results from this specification suggest that improving an adult's numeracy skills to level 1 will raise their earnings by about 6%.

The evidence on literacy is more mixed because there are significant differences between the two data sets used. With no controls, level 1 literacy is associated with having 15% higher

[7] The 15-19% log(earnings) gap translates into a gap of 16-20 higher earnings for those with level 1 skills. Of course, for smaller gaps the impact on log(earnings) and the level of earnings is approximately the same.

log(earnings) (similar to the numeracy effect). Once other variables are added to the model, the effect from level 1 literacy is reduced to 1–3%[8] in the NCDS but is still 11% in the IALS.

Table 2. Earnings premia for people with level 1 numeracy and literacy skills

	No controls	With some controls	With full controls
Numeracy level 1			
IALS estimates	0.187 (0.050)	0.066 (0.043)	
NCDS estimates	0.147 (0.041)	0.069 (0.036)	0.057 (0.037)
Literacy level 1			
IALS estimates	0.152 (0.061)	0.114 (0.054)	
NCDS estimates	0.148 (0.044)	0.026 (0.039)	0.013 (0.041)
Controls			
Family background		Yes	Yes
Age 7 ability			Yes
Age 16 ability			Yes
Education level		Yes	Yes

Note: This table shows the coefficients on the level 1 numeracy and literacy skills dummy variables from different wage equation specifications. The interpretation of the coefficients is the percentage difference between the wages of an individual with level 1 numeracy or literacy skills and someone with literacy or numeracy skill levels below level 1. For example, the first number in the third column (headed 'some controls') suggests that an individual with level 1 numeracy skills has log(earnings) 6.6% higher than an individual with the same family background and education, but whose numeracy skills are below level 1. Results are for men and women combined. The dependent variable is log(earnings). See Dearden *et al*, Table 3.1, 2000. Standard errors are given in parentheses.

Evidence from Dearden *et al* (2000) also suggests that better numeracy is associated with higher employment rates. Specifically, individuals with level 1 numeracy skills are around 5 percentage points more likely to be employed (not taking into account other factors). Even in the full model where we compare individuals with the same family background, education level, age 7 and age 16 ability, level 1 numeracy skills are still associated with having a 2–3 percentage point higher probability of being in employment, compared to someone whose numeracy skills are below level 1. Again, the IALS and NCDS literacy results differ. With no controls in the model, having

[8] The estimate is statistically insignificant in the model with some controls.

level 1 literacy skills is associated with a 5 percentage point higher probability of employment in the NCDS and a 13 percentage point higher probability in the IALS. Once all the controls are added, including education level, there is no effect from level 1 literacy in the NCDS but a 10 percentage point higher probability of employment in the IALS.

4. Data

The work for this report again utilises data from the NCDS, which is a continuing longitudinal survey of people living in Great Britain, born between 3 and 9 March, 1958. This birth cohort (and other associated parties like their parents and teachers) have been surveyed at ages 0, 7, 11, 16, 23, 33 and (for a 10 percent sub-sample) at 37. The data set contains a large amount of information about the individual cohort members, particularly on individuals' academic qualifications, reading and mathematics ability at various ages, and indicators of soft skills. Table A1 in the appendix gives descriptive statistics and sample sizes. We derive two samples from these data and use them to estimate equations that explain differences in individuals' labour market outcomes, in terms of their basic skills and other background characteristics. Firstly, the larger sample consists of all individuals who have valid data up to 1991. Secondly, the smaller 10% sub-sample consists of individuals who have valid data up to 1991 *and* who were also given adult literacy and numeracy tests at age 37.

Literacy and Numeracy Measures

Literacy and numeracy are measured by tests given to survey respondents at ages 16 and 37.[9] The age 16 tests examine individuals' skills in mathematics and reading. The former test contains 31 multiple choice questions examining a range of topics from the school mathematics syllabus, covering areas such as geometry and algebra. The reading test presents respondents with 35 sentences, each with one word missing, and requires respondents to select a word from a choice of five that is most suitable to complete the sentences. Descriptive statistics on these tests can be found in Table A1 in the appendix.

[9] The 1995, age 37, survey was a *random* 10% sample of the full birth cohort.

The adult literacy and numeracy tests at age 37 were designed by the National Foundation for Educational Research. The tests consist of eight literacy tasks (with 23 different questions) and nine numeracy tasks (18 different questions), which measure a person's ability to apply literacy and numeracy skills to an every day context. For example, one question assesses the respondents' ability to read and use a Yellow Pages directory. The adult literacy skill measure (with a maximum score of 23) is right censored, with a relatively low standard deviation, and 20% of the sample achieved the highest literacy score possible. This reflects the fact that the literacy test is not a good discriminator at the upper end of the distribution, and was primarily designed to identify basic skills problems, rather than focus on higher achievers. The numeracy test scores are more widely distributed, and only 5% of the sample achieved the highest score. For the purposes of this report, we use the BSA categories which classify individuals as follows: Entry Level skills or below, Level 1 skills and Level 2 skills or above (listed under *Adult Skills* in the summary table, Table A1 in the appendix)[10]. An advantage of using these groupings is that the policy discussion and the targets for literacy and numeracy have used these classifications.

'Soft skills' and Attitudes

As discussed, the NCDS is also a particularly rich source of information on respondents' attitudes and 'soft skills'. For example, the age 16 survey gives respondents an opportunity to outline their attitudes to school, providing us with indicators of their motivation for, and attitudes to, learning. Specifically, the questionnaire asks respondents to say how much they agree with the following statements:

'I feel school is largely a waste of time,'

'I am quiet in the classroom, and get on with my work,'

'I think homework is a bore,'

'I find it difficult to keep my mind on my work,'

'I never take work seriously,'

'I don't like school,'

'I think there is no point in planning for the future,' and

'I am always willing to help the teacher'[11].

The age 16 questionnaire also gives information on respondents' official attendance record in school, yet another indicator of their motivation and willingness to learn. Another set of variables, measuring respondents' social skills and ability to interact with other people, are taken from surveys of the children's parents and their teacher[12]. Parents and teachers are asked to report whether each child destroys property, often fights with other children, is not much liked by other children, tends to be on his or her own a lot, and bullies other children. In addition, teachers are asked to place the child on a 1-5 scale, indicating the degree to which the child could be described as cautious, moody, timid, rigid, withdrawn and lazy. All of this childhood information provides us with indicators of the child's non-academic development, social skills and attitudes towards school and life in general.

To supplement this childhood information, we have further information on adult 'soft skills', self-reported by respondents in the 1995 survey. Respondents are aged 37 at this time and provide information on the following; their people skills, ability to trust others, tendency to argue, attitudes towards achievement, need for control and caring skills.

We add all of the variables mentioned above to the basic wage models used in our previous work (Dearden *et al*, 2000), thereby evaluating the impact of these factors on the outcome variables, and also determining whether the impact of 'harder' skills, such as literacy and numeracy, is attenuated once we control for such 'soft skills'. The key outcomes that we consider here are highest qualification level, employment status at age 33, and real hourly wage rate at age 33.

Other Variables

The remaining variables in the estimated equations represent our attempt to control for other background characteristics that can influence the outcome variables listed above. There is clear

[10] Note that new National Standards have been developed by the QCA, with their 'Foundation' and 'Intermediate+' categories broadly corresponding to the BSA Levels 1 and 2+ used in the report. We continue to use the BSA categories, as the tests in the NCDS were specifically designed to be mapped onto the BSA classification.
[11] We re-ordered the coding on some of these variables, so that they are all 'negative' questions, identifying unmotivated individuals, in order to ease the interpretation of the results.
[12] These assessments by teachers and parents, as well as the official school attendance records, can be regarded as 'hard data', compared to the self-assessments made by the respondents themselves.

issue that emerges here about precisely what one should control for and there are some differences in existing work.[13] The variables used here are school and family background variables (parents' interest in child's education, parents' education, father's social class, indicators of financial difficulties and type of school), as well as labour market, regional and employer information (firm size, sector and union status). Again, more detailed information on these variables and the justification for their use can be found in Dearden *et al* (2000).

5. Methodology

Labour Market Outcomes and Literacy and Numeracy

This research primarily examines the relationship between age 16 reading and mathematics test scores, and also adult literacy and numeracy test scores, and the labour market outcomes of interest. For the age 16 tests, individuals are allocated to quintiles in reading and mathematics. The base case is always an individual in the bottom quintile. For the adult literacy and numeracy test scores we use a dummy variable approach, based on Basic Skills Agency Standard levels. The omitted category includes all individuals with literacy and numeracy skills below BSA level 1. The reason for focusing on level 1 adult literacy and numeracy skills is twofold. First, level 1 has been suggested by the Moser Report (DfEE, 1999) to be the minimum acceptable level of literacy and numeracy for adults. Second, due to the small sample sizes involved, there are empirical difficulties with estimating models that use a base comparison group consisting of only individuals with very poor (below entry level) skills.

We estimate equations separately for males and females. Three specifications are estimated in each case. The first specification estimates the effect of literacy and numeracy on the relevant outcome variable, controlling only for the background characteristics of the respondents. In the second specification we add the measures of the individual's motivation and 'soft skills', to determine whether the effects of literacy and numeracy are severely attenuated by the addition of

[13] For example, some authors (Gregg and Machin, 1999) do not control for school variables as school is one of the transmission mechanism they do not want to remove from their empirical work. Others (like Dearden, Ferri and Meghir, 1998) do want to control for type of school as their focus is on the effects of school quality.

these 'soft skills' into the model. In the final specification we also control for individuals' ability at age 7[14] and their highest qualification. These final controls allow for the early ability of the child, to allow for differences in pre-school ability, as well as their achievement, in terms of qualifications acquired. However, clearly literacy and numeracy skills also have a positive effect on the level of qualifications an individual achieves[15]. Hence by controlling for highest qualification, we hold this effect constant, and measure only the impact from literacy and numeracy on wages and employment, that occurs *over and above* the effect on an individual's education level. By excluding a person's highest qualification level (specification 2), we obtain the larger, full effect of literacy and numeracy that occurs both through a direct effect on wages and employment, and an indirect effect via higher education levels.

Improvements in Adult Literacy and Numeracy Skills

The second stage of this research attempts to evaluate more directly the impact on an individual's wage from *improving* his or her basic skills. The optimal way to measure the impact (and indeed the cost effectiveness) of any literacy and numeracy programme would be to take a sample of individuals, measure their literacy and numeracy skills, randomly assign half the sample to a literacy or numeracy programme, and then measure the outcomes of the two groups. This kind of random experiment is however, quite rare in this branch of social science, and we must pursue other methodologies. The previous work by Dearden *et al* (2000) and McIntosh and Vignoles (2000) examined the impact of literacy and numeracy at age 37 on labour market outcomes, conditioning for basic skills at age 16. These value-added models therefore attempted to measure the impact of ***changes*** in adult literacy and numeracy skills between the ages of 16 and 37 on earnings. However, this work had a number of unavoidable limitations. First, the age 16 tests were not the same as those used at age 37, so the value-added model is imperfect. More importantly, we know that a multitude of factors might influence adults' basic skills, not just taking a specific literacy or numeracy course. For example, individuals who have more work experience tend to have better literacy and numeracy skills. Yet our ultimate objective is to measure the impact of systematic educational interventions to improve adults' basic skills. We therefore adopt a new approach here, attempting to get closer to this objective.

[14] Based on tests of maths and reading similar in design, though obviously not content, to those administered to the survey respondents at age 16.

We use four separate measures of changes in skills. The first is based on specific survey questions, which ask respondents whether they have taken a basic literacy or numeracy course between the two survey dates. We can thus evaluate whether those who have taken such a course, do better, relative to those who have not. There are two potential problems with this approach. Firstly, the sample sizes are extremely small: far less than 1% of the sample have ever taken these courses. Furthermore, bias may be caused by the self-selection of individuals onto such courses. Individuals who feel the need to take, or are recommended to undertake, such courses might be lower quality workers in the labour market. If there are aspects of worker quality that are not fully controlled for in our analysis, then the literacy/numeracy course variables will pick up these effects, and their coefficients will be biased downwards. Equally individuals who take such courses may be extremely motivated, given their poor level of initial skill, and therefore not representative of all those with poor skill levels. In this instance the coefficients on the course variables may be biased upwards[16].

A second measure of skill improvement is to compare respondents' literacy and numeracy test scores at ages 16 and 37.[17] For literacy and numeracy separately, we divide the distribution of scores at both points in time into quintiles, and then define 'improved skills' variables as the number of quintiles an individual has moved up the literacy and numeracy skills distributions. These improvement variables take the value of zero if the individual has not moved up the literacy and numeracy distributions, or indeed has fallen down. Around 5-6% of the sample experience a gain in their numeracy skills, and 5-7% in their literacy skills. We also interact these 'improved skills' variables with indicators of low initial skills, based on the age 16 tests, to determine whether or not improving one's skills has a differential effect on low and high skilled individuals. 2-4% of the sample are low-skilled workers who experience a gain in their numeracy or literacy skill level.

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[15] Indeed, we show this to be the case in the results section.

[16] Our findings that the acquisition of qualifications at the lower end does not seem to confer wage gains suggests that the second (upward) bias may not be relevant, or that the first (downward) bias of indicating low (uncontrolled-for) ability dominates.

[17] As pointed out above, however, the tests are very different at the two points in time, and so a comparison may not strictly be measuring a change in a given set of basic skills.

A third measure of skill improvement is constructed by identifying low-qualified individuals, i.e. individuals who have no qualifications at all or NVQ1 or below, who have gone on to acquire new qualifications between the ages of 23 and 33. We do this simply by comparing individuals' highest qualification level at the time of each survey. 11% of females and 20% of males, who initially had no qualifications at all, or below NVQ1, gained qualifications over this period, although most gained only low level qualifications. Again note that the self-selection of low-qualified adults onto courses to improve their qualifications after the normal school leaving and qualification-acquiring age may bias the results on this variable.

Finally, we consider self-reported measures of skill improvements. The 1991 survey asked respondents whether their mathematics and writing skills had improved, or indeed worsened, since the last sweep of the survey. We create dummy variables to identify each of these situations and examine their effect on outcomes. 32% of males and 26% of females claimed to have improved their numeracy skills, whilst just under 30% of women and 40% of men believed that they had better literacy skills. Only around 7-8% of the sample thought that their numeracy or literacy skills had actually worsened.

These four skill improvement measures are entered into our basic models, to try to identify the effect of skill improvement on wages (and employment). However, the possibility of bias remains because we may not be fully controlling for certain unobserved characteristics/abilities of the individual, that are positively correlated with the skill measures that we include in our models, and that also have a positive impact on outcomes. To overcome this problem, we therefore also estimate fixed-effects wage equations, in which the dependent variable is the log change in real hourly earnings experienced between the 1981 and 1991 surveys (that is, between the ages of 23 and 33). This technique is useful since it "differences" both the left-hand side of the equation (wage at 33 minus wage at 23) and the right hand side of the model. Thus any characteristic that stays the same between the two periods, such as gender, is no longer included as an explanatory variable in the equation. If one assumes that a person's unobserved characteristics and abilities do not change between age 23 and 33, then these too should no longer appear on the right-hand side of the equation, thus eliminating the need to measure them. The only explanatory variables in these fixed-effect equations therefore measure *changes* in

skills, all other variables assumed to be constant over the ten-year period and so dropping out of the first-differenced specification.

6. Results

This section presents our results, focusing on the effect of age 16 reading/mathematics skills and measures of adult literacy and numeracy on qualification levels, employment probabilities and wages. In each case, we examine the impact of age 16 test scores on the outcome concerned, and whether or not the relationship between reading/mathematics and outcomes is attenuated by the inclusion of measures of 'soft skills'. We then examine the impact of adult literacy and numeracy scores on the same outcomes[18] (but using the 10% sub-sample), again evaluating the effect of including measures of 'soft skills' in the model.

Age 16 Reading/Mathematics Test Scores and Qualifications Achieved

Tables A2 and A3 in the appendix show the determinants of the highest qualification achieved for males and females respectively. Tables 3 and 4 below summarise the results on the skill variables, and also provide the results on the 'soft skills' variables that achieve statistical significance. The dependent variable is a six-fold ordered categorical variable, ranging from no qualifications by age 33, through to NVQ5 or equivalent achieved by age 33. The equation is estimated by ordered probit due to the ordered nature of the categorical educational qualifications variable. As described earlier, in all specifications we condition for family background, parental interest in the respondent's schooling, social aptitude at age 7, type of school attended and current region of residence. The key variables of interest are obviously the age 16 reading and mathematics measures (highlighted).

Table 3: Determinants of highest qualification for males by age 33: dependent variable qualification level (6 ordered categories)

	(1)	(2)	(3)
Test scores:			

[18] In the case of qualification levels, we only examine the effect of age 16 reading and mathematics skills on the highest qualification achieved.

Math ability at 16 (5th quintile)	0.953***	(0.066)	0.723***	(0.068)	0.664***	(0.069)
Math ability at 16 (4th quintile)	0.517***	(0.060)	0.365***	(0.062)	0.325***	(0.062)
Math ability at 16 (3rd quintile)	0.332***	(0.057)	0.255***	(0.058)	0.228***	(0.058)
Math ability at 16 (2nd quintile)	0.103*	(0.057)	0.079	(0.058)	0.072	(0.058)
Verbal ability at 16 (5th quintile)	0.800***	(0.064)	0.724***	(0.066)	0.662***	(0.067)
Verbal ability at 16 (4th quintile)	0.592***	(0.059)	0.551***	(0.061)	0.500***	(0.061)
Verbal ability at 16 (3rd quintile)	0.432***	(0.056)	0.403***	(0.058)	0.363***	(0.058)
Verbal ability at 16 (2nd quintile)	0.361***	(0.055)	0.345***	(0.056)	0.319***	(0.056)
Attitude variables (self-reported):						
Difficult to keep my mind on work			-0.065 *	(0.036)	-0.063*	(0.036)
Homework is a bore			-0.119***	(0.035)	-0.122***	(0.035)
I never take work seriously			-0.100*	(0.052)	-0.101**	(0.052)
School as waste of time			-0.118**	(0.057)	-0.115**	(0.057)
Parental view:						
Bullies other children			-0.185**	(0.077)	-0.182**	(0.077)
Destroys property			-0.188*	(0.097)	-0.184*	(0.097)
School view:						
Proportion of half days absent			-0.732***	(0.133)	-0.727***	(0.133)
Child lazy 5-scale			-0.103***	(0.016)	-0.105***	(0.016)
Child timid 5-scale			-0.046*	(0.026)	-0.040	(0.026)
Fights with other children			-0.159**	(0.075)	-0.154**	(0.075)
Controls	Family background Region		Family background Region Soft skills / attitudes		Family background Region Soft skills / attitudes Age 7 ability	

Table reports results for age 16 ability variables and soft skills with significant coefficients only. Full results in Table A2. Standard errors in parentheses.

* significant at 10% level; ** significant at 5% level; *** significant at 1% level

Table 4: Determinants of highest qualification for females by age 33: dependent variable qualification level (6 ordered categories)

	(1)		(2)		(3)	
Test scores:						
Math ability at 16 (5th quintile)	0.826***	(0.066)	0.620***	(0.068)	0.542***	(0.069)
Math ability at 16 (4th quintile)	0.441***	(0.057)	0.306***	(0.058)	0.263***	(0.058)
Math ability at 16 (3rd quintile)	0.241***	(0.051)	0.150***	(0.052)	0.133**	(0.052)
Math ability at 16 (2nd quintile)	0.144***	(0.049)	0.111**	(0.050)	0.106**	(0.050)
Verbal ability at 16 (5th quintile)	0.971***	(0.067)	0.872***	(0.069)	0.772***	(0.070)
Verbal ability at 16 (4th quintile)	0.834***	(0.060)	0.729***	(0.062)	0.651***	(0.063)
Verbal ability at 16 (3rd quintile)	0.653***	(0.055)	0.574***	(0.057)	0.515***	(0.058)
Verbal ability at 16 (2nd quintile)	0.404***	(0.053)	0.354***	(0.054)	0.310***	(0.055)
Attitude variables (self-reported):						
I don't like school			-0.205***	(0.040)	-0.213***	(0.040)
Difficult to keep my mind on work			-0.076**	(0.036)	-0.089**	(0.036)
Homework is a bore			-0.071**	(0.034)	-0.073**	(0.034)
School as waste of time			-0.150**	(0.063)*	-0.142**	(0.063)
Parental view:						
School view:						
Proportion of half days absent			-0.759***	(0.118)	-0.760***	(0.118)
Child lazy 5-scale			-0.084***	(0.017)	-0.085***	(0.017)
Child unflexible 5-scale			-0.055**	(0.022)	-0.052**	(0.022)
Child timid 5-scale			-0.079***	(0.026)	-0.071***	(0.026)

Controls	Family background Region	Family background Region Soft skills / attitudes	Family background Region Soft skills / attitudes Age 7 ability

Table reports results for age 16 ability variables and soft skills with significant coefficients only. Full results in Table A3. Standard errors in parentheses.
* significant at 10% level; ** significant at 5% level; *** significant at 1% level

In specification 1, with no controls for 'soft skills', the coefficients on the age 16 reading and mathematics variables are strongly significant for both males and females. Having better reading and mathematics skills at age 16 is associated with a significant improvement in an individual's chances of obtaining higher level qualifications. In the second specification, including all the 'soft skills' described in Section 4 does reduce the magnitude of the skill coefficients, particularly on the mathematics variables, although both the reading and the mathematics variables remain positive and highly significant. Including the 'soft skill' measures reduces the size of the mathematics coefficients for both men and women, and the coefficients on verbal or reading ability by less, but the associations remain strongly significant. In the final specification, the respondent's early ability in mathematics and reading is added. The coefficients on the age 16 reading and mathematics variables fall a little further, as one might expect, but the general pattern remains the same. Even taking account of early ability, age 16 reading and mathematics skills show a positive and strongly significant link with the highest education level achieved by an individual by age 33.

An interesting question is which 'soft skills' are significantly related to the highest qualification achieved. Pupils who expressed negative attitudes towards their school work ('I don't get on with my work'; 'home work is a bore'; 'school is a waste of time') do have a lower probability of achieving higher level qualifications, again as one might expect. For males, being a bully and destroying property also seems associated with a lower level of achievement. For men and women, being absent from school and being labeled as 'lazy' reduces one's chances of achieving higher level qualifications. Being timid is a negative factor for women, whereas fighting with other children is a negative factor for men. For males, having a tendency to be on one's own tends to *increase* the probability of getting better qualifications. The overriding pattern is, however, that the soft skills are much less important, taken as a whole group, as compared to the basic literacy and numeracy variables.

Age 16 Reading/Mathematics Test Scores and Employment

Tables A4 and A5 in the appendix give full details of the associations between age 16 test scores (highlighted) and the probability of being employed, for males and females respectively. The zero-one nature of employment status at survey date means that the equation is estimated using the probit technique. The probability of being employed for males, at least for this birth cohort, is largely the likelihood of not being unemployed (since most males are in the labour market at age 33). For women, however, the probability of being employed represents a combination of the likelihood of not being unemployed, given the decision to participate in the labour market in the first place. Around a third of women in the NCDS are out of the labour market altogether at age 33. Tables 5 and 6 below summarise the results for the age 16 ability variables and the 'soft skills' variables that attract statistically significant coefficients. The coefficients are rescaled and given as marginal effects and can therefore be interpreted as probabilities. For example, the coefficients on the age 16 test score variables tell us the additional probability that individuals at those levels of ability will be employed, relative to individuals who score in the lowest quintile, holding all other factors in the equation constant. We discuss males and females separately.

Table 5: 1991 employment status and age 16 reading and mathematics tests for males: dependent variable 0-1 employment dummy

	(1)		(2)		(3)	
Test scores:						
Math ability at 16 (5th quintile)	0.066***	(0.010)	0.055***	(0.010)	0.048***	(0.011)
Math ability at 16 (4th quintile)	0.049***	(0.009)	0.041***	(0.010)	0.034***	(0.011)
Math ability at 16 (3rd quintile)	0.031***	(0.010)	0.026**	(0.010)	0.018***	(0.006)
Math ability at 16 (2nd quintile)	0.010	(0.014)	0.010	(0.011)	0.005	(0.011)
Verbal ability at 16 (5th quintile)	-0.005	(0.022)	-0.017	(0.021)	-0.030*	(0.016)
Verbal ability at 16 (4th quintile)	0.026**	(0.009)	0.018	(0.012)	0.006	(0.013)
Verbal ability at 16 (3rd quintile)	0.015	(0.014)	0.008	(0.015)	-0.006	(0.013)
Verbal ability at 16 (2nd quintile)	0.018	(0.012)	0.011	(0.013)	0.001	(0.012)
Attitude variables (self-reported):						
I don't get on with my work			-0.015	(0.010)	-0.014**	(0.007)
Parental view:						
Bullies other children			0.017*	(0.008)	0.019	(0.013)
Fights with other children			-0.020**	(0.007)	-0.019	(0.014)
School view:						
Proportion of half days absent			-0.052*	(0.027)	-0.039	(0.027)
Controls	Family background Region		Family background Region Soft skills / attitudes		Family background Region Soft skills / attitudes Age 7 ability Qualifications	

Table reports results for age 16 ability variables and soft skills with significant coefficients only. Full results in Table A4. Reported coefficients are marginal effects, and thus reflect the percentage point changes in the probability of employment, when each variable holds. Standard errors in parentheses.
Underlying coefficient * significant at 10% level; ** significant at 5% level; *** significant at 1% level

Table 6: 1991 employment status and age 16 reading and mathematics tests for females: dependent variable 0-1 employment

	(1)		(2)		(3)	
Test scores:						
Math ability at 16 (5th quintile)	0.050*	(0.029)	0.044	(0.030)	0.011	(0.030)
Math ability at 16 (4th quintile)	0.012	(0.026)	0.004	(0.027)	-0.016	(0.026)
Math ability at 16 (3rd quintile)	0.064***	(0.021)	0.057***	(0.022)	0.049**	(0.020)
Math ability at 16 (2nd quintile)	0.043**	(0.022)	0.043**	(0.021)	0.036*	(0.020)
Verbal ability at 16 (5th quintile)	0.074***	(0.028)	0.074***	(0.029)	0.022	(0.030)
Verbal ability at 16 (4th quintile)	0.068***	(0.026)	0.061**	(0.027)	0.017	(0.028)
Verbal ability at 16 (3rd quintile)	0.038	(0.025)	0.034	(0.026)	-0.005	(0.026)
Verbal ability at 16 (2nd quintile)	0.041*	(0.024)	0.040*	(0.024)	0.015	(0.023)
Attitude variables (self-reported):						
I don't help the teacher			-0.030	(0.020)	-0.035*	(0.019)
I don't like school			-0.034*	(0.019)	-0.025	(0.018)
I never take work seriously			0.033	(0.024)	0.038*	(0.021)
Parental view:						
Tends to be on own			-0.039***	(0.014)	-0.036**	(0.013)
School view:						
Child moody 5-scale			0.012	(0.007)	0.013*	(0.007)
Controls	Family background Region		Family background Region Soft skills / attitudes		Family background Region Soft skills / attitudes Age 7 ability Qualifications	

Table reports results for age 16 ability variables and soft skills with significant coefficients only. Full results in Table A5. Reported coefficients are marginal effects, and thus reflect the percentage point changes in the probability of employment, when each variable holds. Standard errors in parentheses.
Underlying coefficient * significant at 10% level; ** significant at 5% level; *** significant at 1% level

The first specification, which does not control for 'soft skills', shows that men with better mathematics skills at age 16 are significantly more likely to be in work. The estimates are positive and statistically significant at the 3rd quintile of the maths ability distribution and above. Being in the top quintile for mathematics at age 16 corresponds to almost a 7 percentage points higher probability of being employed relative to men in the lowest quintile. The estimated coefficients on the reading variables are generally insignificantly different from zero.

In specification 2, we add the measures of 'soft skills'. This reduces the magnitude of the mathematics marginal effects, although only slightly. Thus being in the top quintile in mathematics is now associated with a 6 percentage points higher probability of being employed,

allowing for the person's attitudes and 'soft skills'. Most of the 'soft skill' variables are themselves insignificant. The largest association with employment is found amongst males who fought with others as children: their probability of employment is 2 percentage points lower than non-fighters, holding other factors constant. The specification in the last column of the table includes both final qualification level and age 7 early ability controls. Their inclusion again reduces the coefficients on the age 16 mathematics variables, but does not eliminate the effect altogether. Being in the top quintile in mathematics at age 16 is still associated with a 5% higher probability of being employed, even taking into account the person's early ability and how well they do in terms of qualifications.[19] This result is remarkably strong, and the implied employment probability differences large, showing a clear independent connection with mathematics skills, over and above any relationship between 'soft skills', ability and qualifications.

For women, reading skills at age 16 are strongly linked to being in work, mainly for those in the 4th and 5th quintiles. For example, in specification 1 with no 'soft skill' controls, being in the top quintile for reading at age 16 increases the probability of female employment by 7 percentage points, relative to the bottom quintile. The coefficients on the age 16 mathematics variables are less precisely estimated, although some are strong and positive, particularly for those in the 2nd and 3rd quintiles. Including 'soft skill' measures has little effect on the magnitude of the associations with the age 16 reading and mathematics variables. In the final column of Table 7, age 7 early ability measures and qualifications are included in the model. As for males, qualifications have a large effect on the probability of being employed for women. For example, women with NVQ5 or equivalent have a 20% higher probability of being employed than women with no qualifications. However, unlike for males, the inclusion of these early ability and qualification variables substantially reduces the coefficients on the age 16 mathematics and reading measures, and the reading variables all become insignificant. Hence for women, unlike for men, it is difficult to identify a strong independent effect from reading and mathematics skills on employment, over and above the indirect effect of these skills on employment via qualification level achieved.

[19] Qualification levels themselves have a sizeable impact on the probability of being employed. Even having just NVQ level 1 or 2 or equivalent increases the probability of employment for males by 4-5 percentage points. The

As for men, again almost all the 'soft skill' variables attract statistically insignificant coefficients. The exceptions are that, for women, the tendency to be a loner as a child, to be unhelpful at school and never to take it seriously are all associated with a 4 percentage point lower probability of being employed later in life.

Adult Literacy/Numeracy and Employment

Tables A6 and A7 in the appendix provide full results from models looking at the links between *adult* literacy and numeracy skills (highlighted) and employment, again for males and females respectively. Note that because these specifications also include *age 16* reading and mathematics scores they are measuring the links with improvements in skills over time. Specifically, the coefficients on the adult literacy and numeracy variables measure the connection with having better adult skills, for a given level of skill at age 16.

Tables 7 and 8 below summarise the key results on the adult skill variables and the soft skill variables that attract statistically significant coefficients. Since the dependent variable is again a 0/1 variable indicating employment or otherwise, the coefficients are again rescaled as marginal effects, describing the percentage point change in the probability of employment associated with a given independent variable. For example, the first coefficient for men in column 1 indicates that a male with numeracy skills at level 1 has a probability of employment 4 percentage points higher than that of someone whose numeracy skills are below level 1

Table 7: 1991 employment status and adult literacy/numeracy for males: dependent variable 0-1 employment dummy

	(1)		(2)		(3)	
Adult skills:						
Adult Numeracy skills-average (Level 1)	0.038*	(0.019)	0.015	(0.632)	0.010	(0.547)
Adult Numeracy skills-good (Level 2+)	0.048*	(0.023)	0.014	(0.581)	0.008	(0.458)
Adult Literacy skills-average (Level 1)	0.040*	(0.021)	0.021*	(0.849)	0.016	(0.874)
Adult Literacy skills-good (Level 2+)	0.047*	(0.028)	0.022	(0.868)	0.013	(0.731)
Attitude variables (self-reported):						
I don't help the teacher			0.020*	(0.858)	0.012	(0.704)
Difficult to keep my mind on work			-0.047***	(1.693)	-0.032**	(1.614)
Parental view:						
School view:						
Child moody 5-scale			-0.014*	(0.544)	-0.008	(0.445)
Fights with other children			0.023	(1.033)	0.018*	(1.084)

effect is not linear. Workers with no qualifications are the vulnerable group in this regard.

Adult Soft Skills:						
Usually achieves in life			0.056***	(0.056)	0.047***	(2.259)
Trusts most people			0.026**	(1.000)	0.024**	(1.242)
Controls	Family background		Family background		Family background	
	Region		Region		Region	
	Age 16 ability		Age 16 ability		Age 16 ability	
			Soft skills / attitudes		Soft skills / attitudes	
					Age 7 ability	
					Qualifications	

Table reports results for adult ability variables and soft skills with significant coefficients only. Full results in Table A6. Reported coefficients are marginal effects, and thus reflect the percentage point changes in the probability of employment, when each variable holds. Standard errors in parentheses.
Underlying coefficient * significant at 10% level; ** significant at 5% level; *** significant at 1% level

Table 8: 1991 employment status and adult literacy/numeracy for females: dependent variable 0-1 employment dummy

	(1)		(2)		(3)	
Adult skills:						
Adult Numeracy skills-average (Level 1)	0.033	(0.040)	0.026	(0.217)	0.013	(0.125)
Adult Numeracy skills-good (Level 2+)	0.045	(0.046)	0.035	(0.303)	0.006	(0.071)
Adult Literacy skills-average (Level 1)	-0.012	(0.046)	-0.013	(0.112)	-0.050	(0.423)
Adult Literacy skills-good (Level 2+)	0.014	(0.051)	0.012	(0.107)	-0.036	(0.312)
Attitude variables (self-reported):						
There's no point planning for the future			0.138***	(1.413)	0.144***	(1.537)
Parental view:						
School view:						
Child unflexible 5-scale			-0.045*	(0.368)	-0.047*	(0.407)
Adult Soft Skills:						
Good caring skills			-0.047	(0.390)	-0.052*	(0.461)
Feels life is under their control			-0.104*	(1.019)	-0.114**	(1.200)
Controls	Family background		Family background		Family background	
	Region		Region		Region	
	Age 16 ability		Age 16 ability		Age 16 ability	
			Soft skills / attitudes		Soft skills / attitudes	
					Age 7 ability	
					Qualifications	

Table reports results for adult ability variables and soft skills with significant coefficients only. Full results in Table A7. Reported coefficients are marginal effects, and thus reflect the percentage point changes in the probability of employment, when each variable holds. Standard errors in parentheses.
Underlying coefficient * significant at 10% level; ** significant at 5% level; *** significant at 1% level

For males, having higher level literacy and numeracy as an adult increases the chances of being in work, *for a given level of skill at age 16*. Having BSA level 2 numeracy or literacy skills (or above) increases the probability of a man being employed by around 5 percentage points. However, inclusion of the 'soft skills' does more or less halve these effects. Furthermore, due to the small sample sizes involved and the large numbers of explanatory variables in the specifications, some of the estimates become quite imprecise. Once we also compare individuals with the same education and age 7 ability, adult ability shows virtually no link with higher

employment probabilities. As in the previous section, the majority of the 'soft skills' attract statistically insignificant coefficients. Note that for these equations we include adult measures of 'soft skills' too, such as whether a person has good people skills, or good caring skills. The adult 'soft skills' that display a statistically significant association with employment are whether the person believes that they can usually achieve what they want in life, which has a very strong and highly significant effect, raising the probability of employment by 5 percentage points, and whether the person trusts others, which has a slightly smaller positive effect.

For women, the coefficients on the adult numeracy skills are generally positive, but statistically insignificant. Adding 'soft skills', and then early ability and qualifications, reduces the magnitude of the coefficients, and all remain insignificant. For women, the 'soft skills' that have a significant effect on employment are whether the woman feels life is under her control, which gives an apparently counter-intuitive negative effect of a 12 percentage point lower employment probability, and whether the woman believed (as a child) that there was no point in planning for the future, again giving a counter-intuitive positive effect (+14 percentage points) . There is no obvious explanation for these latter results, since, as discussed in the next section, these variables show a more intuitive relationship with wages. Namely, women who felt that there was no point in planning for the future do earn less. However, one possible reading of the employment results is that women who are out of the labour market at age 33 may have chosen to have their children somewhat later in life, consistent with their belief that life is under their control.

Age 16 Reading/Mathematics Test Scores and Wages

Tables A8 and A9 in the appendix provide full results of the relationship between age 16 reading and mathematics skills and wages, for males and females. The key results are summarised in Tables 9 and 10 below.

Table 9: 1991 wages and age 16 reading and mathematics tests for males: dependent variable log hourly wage

	(1)		(2)		(3)	
Test scores:						
Math ability at 16 (5th quintile)	0.203***	(0.032)	0.176***	(0.033)	0.038	(0.033)
Math ability at 16 (4th quintile)	0.110***	(0.030)	0.093***	(0.030)	0.014	(0.030)
Math ability at 16 (3rd quintile)	0.058**	(0.028)	0.047*	(0.029)	0.006	(0.028)
Math ability at 16 (2nd quintile)	0.003	(0.029)	0.005	(0.030)	-0.006	(0.029)

Verbal ability at 16 (5th quintile)	0.198***	(0.031)	0.182***	(0.031)	0.074**	(0.031)
Verbal ability at 16 (4th quintile)	0.173***	(0.028)	0.155***	(0.029)	0.067**	(0.029)
Verbal ability at 16 (3rd quintile)	0.096***	(0.028)	0.077***	(0.028)	0.024	(0.028)
Verbal ability at 16 (2nd quintile)	0.075***	(0.028)	0.062**	(0.028)	0.017	(0.028)
Attitude variables (self-reported):						
Difficult to keep my mind on work			0.013	(0.017)	0.030*	(0.016)
I never take work seriously			-0.055**	(0.026)	-0.034	(0.026)
Parental view:						
Tends to be on own			-0.024	(0.015)	-0.032**	(0.014)
School view:						
Proportion of half days absent			-0.099*	(0.056)	-0.037	(0.055)
Child cautious 5-scale			-0.033***	(0.010)	-0.029***	(0.010)
Child timid 5-scale			-0.033***	(0.012)	-0.026**	(0.012)
Child unsociable 5-scale			-0.016*	(0.009)	-0.017*	(0.009)
Tends to be on own			-0.045**	(0.019)	-0.034*	(0.018)
Controls	Family background Region		Family background Region Soft skills / attitudes		Family background Region Soft skills / attitudes Age 7 ability Qualifications	

Table reports results for age 16 ability variables and soft skills with significant coefficients only. Full results in Table A8. Standard errors in parentheses.
* significant at 10% level; ** significant at 5% level; *** significant at 1% level

Table 10: 1991 wages and age 16 reading and mathematics tests for females: dependent variable log hourly wage

	(1)		(2)		(3)	
Test scores:						
Math ability at 16 (5th quintile)	0.250***	(0.039)	0.190***	(0.040)	0.064*	(0.038)
Math ability at 16 (4th quintile)	0.135***	(0.035)	0.093***	(0.035)	0.031	(0.034)
Math ability at 16 (3rd quintile)	0.038	(0.030)	0.014	(0.030)	-0.007	(0.028)
Math ability at 16 (2nd quintile)	0.002	(0.028)	-0.009	(0.027)	-0.012	(0.026)
Verbal ability at 16 (5th quintile)	0.261***	(0.038)	0.222***	(0.039)	0.083**	(0.038)
Verbal ability at 16 (4th quintile)	0.190***	(0.035)	0.150***	(0.036)	0.060*	(0.035)
Verbal ability at 16 (3rd quintile)	0.125***	(0.032)	0.092***	(0.033)	0.024	(0.032)
Verbal ability at 16 (2nd quintile)	0.016	(0.028)	0.000	(0.030)	-0.033	(0.028)
Attitude variables (self-reported):						
Homework is a bore			-0.041*	(0.021)	-0.022	(0.020)
There's no point planning for the future			-0.066***	(0.024)	-0.064***	(0.023)
Parental view:						
School view:						
Proportion of half days absent			-0.129*	(0.070)	-0.015	(0.064)
Child lazy 5-scale			-0.031***	(0.011)	-0.012	(0.011)
Child unsociable 5-scale			-0.019*	(0.011)	-0.018*	(0.010)
Controls	Family background Region		Family background Region Soft skills / attitudes		Family background Region Soft skills / attitudes Age 7 ability Qualifications	

Table reports results for age 16 ability variables and soft skills with significant coefficients only. Full results in Table A9. Standard errors in parentheses.
* significant at 10% level; ** significant at 5% level; *** significant at 1% level

Reading and mathematics skills display a powerful association with wages. For example, being in the top quintile for mathematics at 16 increases a man's wages by more than 20%, and 25%

for women. Equally being in the top quintile for reading at 16 increases male wages by nearly 20% and female wages by 26%. Even in the second specification, which adds 'soft skills', these strong reading and mathematics skill effects are evident. For example, being in the top quintile for mathematics at 16 increases wages by 18% for males and 19% for women. Thus the 'soft skill' measures are not substantially attenuating the size of the associations between reading and mathematics skills and earnings. Most of the 'soft skill' measures are in fact insignificant, although for males being particularly cautious, timid or unsociable does seem to negatively affect earnings, by 3%, 3% and 2% respectively. Also a male who spent a lot of time on his own as a child earns 4.5% less as an adult, and if he reported not taking work seriously as a child, he earns 5.5% less, holding all other things in the equation constant. The effects of these 'soft skills' on earnings are therefore much smaller than the effects of age 16 reading and mathematics ability. A similar picture emerges for women, the largest effects from the 'soft skills' being found on laziness, unsociability, finding homework a bore, and believing there is no point planning for the future, which reduce wages by 3%, 2%, 4% and 7% respectively.

In the final columns in Tables 9 and 10, early ability measures and qualifications are added to the model. This does substantially reduce the magnitude of the age 16 reading and mathematics coefficients. For males, being in the 5^{th} or 4^{th} quintiles for reading continues to have a positive link with log(earnings), of around 7%. For women, being in the 4^{th} or 5^{th} quintile for reading also boosts log(earnings) (by around 6-8%), as does being in the top quintile for mathematics (by 6%). Therefore we can identify an independent effect from having good reading and mathematics skills on wages, *over and above the effect these skills might have on a person's level of qualifications*. However, much of the impact of these skills on earnings does come via their impact on qualification levels.

The connections with the 'soft skills' variables are attenuated only slightly by the inclusion of the qualifications and early ability variables. Thus the links with these character traits, small as they are, seem to be independent of their influence on educational achievement. It is interesting to note, however, that the coefficient on school absenteeism is substantially reduced, and becomes statistically insignificant, once qualifications are controlled for. Hence, at a given level of qualifications, absenteeism does not further reduce earnings. The main impact of missing school on future earnings seems to work through reduced qualifications achievement.

Adult Literacy/Numeracy Skills and Wages

Tables A10 and A11 show detailed results for the impact of adult literacy and numeracy skills on earnings, taking into account the person's skill level at age 16. To re-iterate, these specifications are attempting to measure the connections between *improvements* in skill levels and earnings. The results are summarised in Tables 11 and 12 below.

Table 11: 1991 wages and adult literacy/numeracy for males: dependent variable log hourly wage

	(1)		(2)		(3)	
Adult skills:						
Adult Numeracy skills-average (Level 1)	0.091*	(0.053)	0.097*	(0.058)	0.086	(0.055)
Adult Numeracy skills-good (Level 2+)	0.126**	(0.054)	0.109*	(0.056)	0.048	(0.055)
Adult Literacy skills-avg (Level 1)	-0.004	(0.058)	-0.007	(0.063)	-0.002	(0.065)
Adult Literacy skills-good (Level 2+)	0.068	(0.062)	0.064	(0.067)	0.065	(0.071)
Attitude variables (self-reported):						
Parental view:						
Bullies other children			-0.243**	(0.113)	-0.168	(0.104)
Fights with other children			-0.125	(0.088)	-0.139*	(0.079)
School view:						
Child cautious 5-scale			-0.050	(0.032)	-0.056*	(0.033)
Child lazy 5-scale			0.028	(0.025)	0.052**	(0.024)
Adult Soft Skills:						
Gets on very well with people			0.086**	(0.043)	0.098**	(0.042)
Controls	Family background Region Age 16 ability		Family background Region Age 16 ability Soft skills / attitudes		Family background Region Age 16 ability Soft skills / attitudes Age 7 ability Qualifications	

Table reports results for adult ability variables and soft skills with significant coefficients only. Full results in Table A10. Standard errors in parentheses.
* significant at 10% level; ** significant at 5% level; *** significant at 1% level

Table 12: 1991 wages and adult literacy/numeracy for females: dependent variable log hourly wage

	(1)		(2)		(3)	
Adult skills:						
Adult Numeracy skills-average (Level 1)	0.095	(0.058)	0.069	(0.067)	0.040	(0.065)
Adult Numeracy skills-good (Level 2+)	0.186***	(0.072)	0.114	(0.078)	0.017	(0.071)
Adult Literacy skills-avg (Level 1)	0.050	(0.064)	0.096	(0.073)	0.039	(0.069)
Adult Literacy skills-good (Level 2+)	0.153**	(0.071)	0.196**	(0.078)	0.090	(0.075)
Attitude variables (self-reported):						
I don't like school			-0.103*	(0.062)	-0.056	(0.061)
I don't get on with my work			-0.139**	(0.070)	-0.127*	(0.069)
Difficult to keep my mind on work			0.089	(0.067)	0.126**	(0.060)
I never take work seriously			0.237***	(0.090)	0.197**	(0.084)
There's no point planning for the future			-0.150**	(0.071)	-0.171**	(0.069)

School as waste of time		-0.239**	(0.107)	-0.240**	(0.111)
Parental view:					
School view:					
Not liked by other children		-0.203*	(0.121)	-0.134	(0.111)
Destroys property		0.548***	(0.161)	0.438***	(0.163)
Adult Soft Skills:					
Argues a lot		0.234**	(0.110)	0.207**	(0.093)
Gets on very well with people		0.055	(0.051)	0.089*	(0.049)
Controls	Family background	Family background		Family background	
	Region	Region		Region	
	Age 16 ability	Age 16 ability		Age 16 ability	
		Soft skills / attitudes		Soft skills / attitudes	
				Age 7 ability	
				Qualifications	

Table reports results for adult ability variables and soft skills with significant coefficients only. Full results in Table A11. Standard errors in parentheses.
* significant at 10% level; ** significant at 5% level; *** significant at 1% level

For males, with no controls for 'soft skills', better adult numeracy skills are strongly linked to higher earnings. Males with BSA Level 1 numeracy skills have log(earnings), on average, around 9% more than those with poorer skill levels. For males with BSA Level 2 numeracy skills, the premium is about 13%. Recall that these estimates take full account of the person's background, schooling, reading and mathematics ability at age 16 and region. Adult literacy appears to have little link with wages for men, for a given level of reading skill at 16, although the small sample sizes involved do make precision a problem. Including the 'soft skill' measures (column 2) hardly has any effect on the coefficients on the adult skill variables. Thus we can identify an independent numeracy effect on earnings, even when we take into account the person's attitudes and 'soft skills', thus countering potential criticism of the previous work on this issue (Dearden *et al*, 2000). Finally, the third model includes age 7 early ability and qualification levels. The inclusion of these variables does ensure that all the adult skill variables become insignificant. Thus much of the effect on wages from having good age 16 reading and mathematics skills, and strong adult literacy and numeracy skills, comes via their impact on qualification levels.

As usual, few of the 'soft skills' variables attract statistically significant coefficients, although some of the estimated coefficients for males in Table 11 are quite large. For example, fighting with other children as a child reduces log(earnings) as an adult by 14%, while being over-cautious as a child reduces them by 6%. On the other hand, getting on well with other people as an adult translates into 10% higher log(earnings).

For women, having BSA Level 2 (or above) skills in both numeracy and literacy boosts earnings substantially. Specifically, women with Level 2 (or above) numeracy have log(earnings) around 19% more than women with skills below Level 1. The log(earnings) of women with Level 2 (or above) literacy are around 15% more than those of women with skills below Level 1. For Level 1 numeracy it is around 10% and from having Level 1 literacy around 5%, although these coefficients are insignificantly different from zero. Including the 'soft skill' measures actually increases the adult literacy coefficients. Their inclusion does attenuate the effect of adult numeracy somewhat, but the insignificance of the coefficients makes interpretation problematic here. On balance, there is still evidence of a strong link between literacy and wages, independent of a person's 'soft skills'. The evidence to support a similar independent link with numeracy is somewhat weaker. As was the case for males, including early ability and qualifications achieved, reduces all of the adult skill coefficients and renders them insignificant.

More of the estimated coefficients on the 'soft skills' variables are statistically significant for women, although some of the results appear to be rather implausible: for example, never taking work seriously and destroying property having *positive* coefficients in the earnings equations. More plausible estimates are those on self-reported attitudes of children not getting on with work, not planning for the future and viewing school as a waste of time. Amongst the adult 'soft skills' for women, getting on well with people has a positive log(earnings) link of about 9%.

Skill Improvements and Wages

Tables 13 and 14 show the relationship between improvements in an individual's basic skills and wages, for males and females respectively. Although the tables only show the coefficients on the skill improvement measures, each equation also controls for family background, parental interest, schooling, *age 16 reading and mathematics skills*, early age 7 ability, 'soft skills' and qualifications. Hence the specifications shown are the same as the third columns in Tables 11 and 12. The objective was to investigate whether; a) for a given level of reading and mathematics skill at age 16, and b) with a given set of 'soft skills' and qualifications, what effect *improvements* in literacy and numeracy skill levels have on wages.

Table 13: 1991 wages and skill improvement for males: dependent variable log hourly wage

	(1)		(2)		(3)~		(4)	
Low qualification person who gained more qualifications by 1991	-0.110***	(0.036)						
Literacy course taken by 1991			-0.004	(0.052)				
Numeracy course taken by 1991			-0.364***	(0.051)				
No. of quintiles literacy skills improved between 16 and 37					0.077**	(0.032)		
No. of quintiles numeracy skills improved between 16 and 37					-0.012	(0.039)		
Improved literacy skills and in quintile 1 or 2 at age 16					-0.061*	(0.037)		
Improved numeracy skills and in quintile 1 or 2 at age 16					0.065	(0.045)		
Self-assessment: numeracy skills improved since last survey							0.028**	(0.014)
Self-assessment: numeracy skills worsened since last survey							0.007	(0.026)
Self-assessment: literacy skills improved since last survey							0.070***	(0.014)
Self-assessment: literacy skills worsened since last survey							-0.024	(0.027)
Observations	1629		3293		2539		3293	
R-squared	0.24		0.34		0.34		0.34	

Standard errors in parentheses. All equations control for family background, parental interest in respondent's schooling, region, age 16 reading and mathematics skills, early ability (age 7), soft skill measures and qualifications level.

~ In this specification, age 16 reading and mathematics test scores must be omitted due to collinearity. Instead dummies indicating whether someone had very low level skills (bottom two quintiles) in reading and mathematics at age 16 were included.

- significant at 10% level; ** significant at 5% level; *** significant at 1% level

Table 14: 1991 wages and skill improvement for females: dependent variable log hourly wage

	(1)		(2)		(3)~		(4)	
Low qualification person who gained more qualifications by 1991	-0.083*	(0.047)						
Literacy course taken by 1991			0.083	(0.097)				
Numeracy course taken by 1991			0.035	(0.084)				
No. of quintiles literacy skills improved between 16 and 37					0.046	(0.034)		
No. of quintiles numeracy skills improved between 16 and 37					-0.106	(0.072)		
Improved literacy skills and in quintile 1 or 2 at age 16					0.004	(0.052)		
Improved numeracy skills and in quintile 1 or 2 at age 16					0.113	(0.077)		
Self-assessment: numeracy skills improved since last survey							0.107***	(0.017)
Self-assessment: numeracy skills worsened since last survey							0.042	(0.032)
Self-assessment: literacy skills improved since last survey							0.052***	(0.017)
Self-assessment: literacy skills worsened since last survey							-0.007	(0.028)
Observations	1761		2866		2223		2866	
R-squared	0.19		0.38		0.38		0.40	

Standard errors in parentheses. All equations control for family background, parental interest in respondent's schooling, region, age 16 reading and mathematics skills, early ability (age 7), soft skill measures and qualifications level.

~ In this specification, age 16 reading and mathematics test scores must be omitted due to collinearity. Instead dummies indicating whether someone had very low level skills (bottom two quintiles) in reading and mathematics at age 16 were included.

* significant at 10% level; ** significant at 5% level; *** significant at 1% level

We use four different measures of skill improvement, as discussed in Section 5.1. Specification 1 includes improvements in a low-skilled individual's *qualification* level. Specifically it measures whether a person with only low-level qualifications (no qualifications or just NVQ1) gains more qualifications by the age of 33. The coefficient in the earnings equation suggests that those individuals who become more qualified actually have lower log(earnings) (by between 8 and 11%) than poorly qualified men and women who do not gain any more qualifications. Specification 2 includes measures of whether people had taken literacy and numeracy courses by 1991.[20] The estimated coefficient on the 'taking a literacy course' variable is statistically insignificant for men and women, and the same is true for the 'taking a numeracy course' variable for women. However, males who took a numeracy course appear to earn substantially less than their peers, who had the same age 16 level of skill and level of qualifications, but who did not take such a course. These results highlight the sample selection problem discussed earlier. Individuals, who take low level qualifications in adulthood, including literacy and numeracy courses, appear to be extremely low productivity workers. Hence the coefficients on the qualification/course variables in specifications 1 and 2 are measuring this low productivity, rather than any positive earnings boost from improving skills. Specification 3 includes variables that directly measure improvements in reading/literacy and mathematics/numeracy that occur between age 16 and 37. The results indicate that, on average, moving up one quintile in literacy raises male earnings by around 8%. However, for males who start with very low levels of literacy skill (quintiles 1 and 2 at age 16), moving up one quintile in literacy only increases earnings by around 2% (equals effect of moving up one quintile in literacy (7.7%) and subtracting the coefficient for workers who improve literacy skills but who start with very low age 16 skills (-6.1%)). The coefficients are all estimated to be insignificant for women. Lastly, specification 4 includes variables that indicate whether the respondent thinks that s/he has improved their numeracy/literacy skills between 1981 and 1991. Male workers who claim that they have improved their numeracy and literacy skills have log(earnings) 3% and 7% higher than their peers, respectively. For women, the numeracy coefficient is stronger, at 11%, while the log(earnings) premium for females who have improved their literacy skill is 5%. Workers' whose skills have deteriorated do not suffer any loss of wages.

[20] As discussed, the numbers of workers who took such courses is extremely small and therefore the coefficients should be treated with caution.

Table 15: 1991 employment and skill improvement for males: dependent variable employment dummy

	(1)		(2)		(3)~		(4)	
Low qualification person who gained more qualifications by 1991	-0.007	(0.025)						
Literacy course taken by 1991			-0.062**	(0.033)				
Numeracy course taken by 1991			-0.223**	(0.130)				
No. of quintiles literacy skills improved between 16 and 37					0.006	(0.023)		
No. of quintiles numeracy skills improved between 16 and 37					0.487***	(0.030)		
Improved literacy skills and in quintile 1 or 2 at age 16					-0.004	(0.025)		
Improved numeracy skills and in quintile 1 or 2 at age 16					-0.480***	(0.029)		
Self-assessment: numeracy skills improved since last survey							0.010	(0.007)
Self-assessment: numeracy skills worsened since last survey							-0.027*	(0.017)
Self-assessment: literacy skills improved since last survey							0.008	(0.007)
Self-assessment: literacy skills worsened since last survey							0.016	(0.011)
Observations	2981		5545		4155		5545	
R-squared	0.13		0.14		0.13		0.14	

Reported coefficients are marginal effects, and thus reflect the percentage point changes in the probability of employment, when each variable holds. Standard errors in parentheses. All equations control for family background, parental interest in respondent's schooling, region, age 16 reading and mathematics skills, early ability (age 7), soft skill measures and qualifications level.

~ In this specification, age 16 reading and mathematics test scores must be omitted due to collinearity. Instead dummies indicating whether someone had very low level skills (bottom two quintiles) in reading and mathematics at age 16 were included.

Underlying coefficient * significant at 10% level; ** significant at 5% level; *** significant at 1% level

Table 16: 1991 employment and skill improvement for females: dependent variable employment dummy

	(1)		(2)		(3)~		(4)	
Low qualification person who gained more qualifications by 1991	0.016	(0.040)						
Literacy course taken by 1991			0.044	(0.061)				
Numeracy course taken by 1991			-0.253*	(0.140)				
No. of quintiles literacy skills improved between 16 and 37					-0.034	(0.033)		
No. of quintiles numeracy skills improved between 16 and 37					0.026	(0.052)		
Improved literacy skills and in quintile 1 or 2 at age 16					0.057	(0.043)		
Improved numeracy skills and in quintile 1 or 2 at age 16					-0.027	(0.057)		
Self-assessment: numeracy skills improved since last survey							0.124***	(0.014)
Self-assessment: numeracy skills worsened since last survey							-0.069***	(0.022)
Self-assessment: literacy skills improved since last survey							0.089***	(0.014)
Self-assessment: literacy skills worsened since last survey							0.017	(0.024)
Observations	3747		5750		4351		5750	
R-squared	0.05		0.05		0.05		0.07	

Reported coefficients are marginal effects, and thus reflect the percentage point changes in the probability of employment, when each variable holds. Standard errors in parentheses. All equations control for family background, parental interest in respondent's schooling, region, age 16 reading and mathematics skills, early ability (age 7), soft skill measures and qualifications level.

~ In this specification, age 16 reading and mathematics test scores must be omitted due to collinearity. Instead dummies indicating whether someone had very low level skills (bottom two quintiles) in reading and mathematics at age 16 were included.

Underlying coefficient * significant at 10% level; ** significant at 5% level; *** significant at 1% level

We also consider the links between skill improvement variables and individuals' employment probabilities, again for males and females separately (Tables 15 and 16 above). The dependent variable is the probability of being employed at age 33, i.e. in 1991. As before, the specifications condition fully for individuals' socio-economic background, their schooling, their early ability (as measured by their age 7 test scores), their childhood attitudes and soft skills, their educational qualifications and finally their literacy and numeracy skills at age 16. These specifications are therefore again identical to those used for the wage equations in the final columns of Tables 11 and 12.

Specification 1 from Table 15 indicates that low-educated males (i.e. with no qualifications or just NVQ1) who succeed in acquiring qualifications over the course of their adult life are no more likely to be employed at age 33 as a result of this educational investment. This result also holds true for women, as shown in Table 16. In other words, when we compare two low very educated individuals, with similar family and school backgrounds, and with similar literacy and numeracy skills at age 16, we find that the individual who goes on to acquire qualifications in adult life is no more likely to be employed at age 33 than the person who does not. Specification 2 in Table 15 suggests that males who have taken a literacy or numeracy course are significantly *less* likely to be employed at age 33. Specifically, those who took a literacy course have a 6 percentage point lower probability of being employed, while those who took a numeracy course have a huge 22 percentage point lower probability of being in work. The same specification in Table 16 indicates that women who took a literacy course are no more (or less) likely to be employed than women who did not take such a course, although women who took a numeracy course do have a 25 percentage point lower probability of being employed. What these counter-intuitive results indicate is that, despite controlling for individuals' early ability, their soft skills and attitudes, and their education and literacy and numeracy on leaving school, those who admit to taking a basic literacy and numeracy course are much less likely to be employed. This may be because only the very lowest skilled individuals take such courses, and we are unable to fully allow for this in our model. Alternatively, it may be that being unemployed or having a history of unemployment causes individuals to take such courses, thus confusing the direction of the relationship between literacy/numeracy and employment.

Specification 3 in Table 15 indicates that males who improve their *numeracy* skills between the ages of 16 and 37 are significantly more likely to be employed than those who do not. Improvements in literacy display no statistical link with employment probabilities for men. However, the interpretation of the coefficients in specification 3 is complex. An individual who has very low numeracy skills at age 16 (bottom two quintiles) and who nonetheless improves their numeracy skill level by one quintile is no more likely to be employed (this probability of zero is calculated by adding +0.487 to (-0.480) in specification 3). On the other hand, individuals who start with higher-level numeracy skills (3rd quintile or above) and who also improve their skills by one quintile, have almost a 50 percentage point higher probability of being in employment. In summary, individuals who improve their numeracy skills do considerably improve their chances of employment, although this effect is not observed for the very low skilled (bottom two quintiles). For women none of the variables in specification 3 are significant, indicating that improvements in literacy and numeracy do not significantly impact on a woman's probability of employment at age 33.

Lastly, specification 4 in Table 15 indicates that males who believe that their numeracy skills have worsened over time do actually have a 3 percentage point lower probability of being employed, even conditioning for their other attitudes and soft skills. However, males who claimed to have *improved* their numeracy skills were not significantly more likely to be employed at age 33. For women (specification 4 in Table 16), those who believed that their numeracy skills had worsened over time were 7 percentage points less likely to be employed. However, unlike for men, women who believed that their literacy and numeracy skills had improved over time were significantly more likely to be employed (by 9 and 12 percentage points respectively).

Many of these results illustrate the potential sample selection problem and the difficulty of controlling for unobserved ability. If one has good enough data one way to overcome this, as discussed in Section 5.1, is to use fixed effect models, and these are reported in Tables 17 and 18 below. A fixed effect model takes the change in all variables between two dates, so that unobserved factors that remain fixed over time (such as ability) drop out of the model. The explanatory variables then measure the impact of skill improvement on the change in earnings between ages 23 and 33.

Table 17: Change in wages and skill improvement for males: dependent variable 1991 – 1981 change in log hourly wages

	(1)		(2)		(3)		(4)		(5)	
Low qualification person who gained more qualifications by 1991	0.023	(0.103)								
Literacy course taken by 1991			-0.142	(0.319)						
Numeracy course taken by 1991			-	-						
No. of quintiles literacy skills improved between 16 and 37					-0.162	(0.108)	0.078	(0.259)		
No. of quintiles numeracy skills improved between 16 and 37					0.124	(0.150)	0.492**	(0.235)		
Improved literacy skills and in quintile 1 or 2 at age 16							-0.221	(0.275)		
Improved numeracy skills and in quintile 1 or 2 at age 16							-0.637**	(0.298)		
Self-assessment: numeracy skills improved since last survey									0.158*	(0.092)
Self-assessment: numeracy skills worsened since last survey									0.385**	(0.161)
Self-assessment: literacy skills improved since last survey									0.277***	(0.086)
Self-assessment: literacy skills worsened since last survey									-0.046	(0.179)
Constant	0.998***	(0.046)	1.005***	(0.041)	1.001***	(0.048)	0.991***	(0.048)	0.820***	(0.060)
Observations	660		660		515		515		660	
R-squared	0.00		0.00		0.00		0.01		0.03	

Standard errors in parentheses
* significant at 10% level; ** significant at 5% level; *** significant at 1% level

Table 18: Change in wages and skill improvement for females: dependent variable 1991 – 1981 change in log hourly wages

	(1)		(2)		(3)		(4)		(5)	
Low qualification person who gained more qualifications by 1991	-0.026	(0.155)								
Literacy course taken by 1991			0.896	(0.797)						
Numeracy course taken by 1991			-0.051	(1.127)						
No. of quintiles literacy skills improved between 16 and 37					-0.215	(0.173)	-0.372	(0.239)		
No. of quintiles numeracy skills improved between 16 and 37					-0.228	(0.207)	-0.111	(0.553)		
Improved literacy skills and in quintile 1 or 2 at age 16							0.302	(0.331)		
Improved numeracy skills and in quintile 1 or 2 at age 16							-0.141	(0.584)		
Self-assessment: numeracy skills improved since last survey									0.184	(0.119)
Self-assessment: numeracy skills worsened since last survey									0.594***	(0.174)
Self-assessment: literacy skills improved since last survey									0.401***	(0.111)
Self-assessment: literacy skills worsened since last survey									0.456**	(0.198)
Constant	0.675***	(0.053)	0.669***	(0.050)	0.741***	(0.057)	0.743***	(0.058)	0.415***	(0.067)
Observations	504		504		368		368		504	
R-squared	0.00		0.00		0.01		0.01		0.05	

Standard errors in parentheses
* significant at 10% level; ** significant at 5% level; *** significant at 1% level

The results are almost uniformly insignificant, for males and females. This is probably not that surprising given the small numbers of changers in the skill improvement categories. There are two exceptions. One pattern of significant results is for males in the top three numeracy quintiles at age 16 who improve their numeracy skills as they age. This group experienced more rapid earnings growth as they moved up the distribution of numeracy skills. However, men from the bottom 2 quintiles who moved up did not experience faster wage growth. For women no clear pattern emerges, as all effects are rather imprecisely determined. The other discernible pattern is that individuals who claim that their have skills have either improved, or indeed worsened, between the survey dates, do systematically better than their peers who experience no change in their skills. Whilst it seems intuitive that that self-assessed improvements in skill may lead to higher earnings growth, it is not clear why the, admittedly small, proportion of workers who claim that their skills have deteriorated also experience more rapid earnings growth. All in all these fixed effects results are probably asking too much of the data, given that people do not change their positions in the skills distribution much over time. Identification of any effects needs a reasonable number of movers and the fact that we only have two observations per cohort member and our sample sizes are low means that this exercise is asking a lot.

7. Conclusions

This research addresses two specific questions. The first asks which skills display the strongest connections with labour market outcomes? Are basic literacy and numeracy the most important skills for securing employment and good wages, or are good 'soft skills', such as motivation and sociability, more useful? The results reveal that literacy and numeracy skills have the larger effect and are important whether or not one accounts for differences in the 'soft skills' possessed by individuals.

Specifically, reading and mathematics skills at age 16 display a strong positive link with the level of qualification achieved. Including measures of the individual's motivation and 'soft skills' (measured at age 16) does not eliminate this. Some of the indicators of 'soft skills', particularly individual's attitudes to school, are important in their own right in determining a person's final

qualification. Reading and mathematics skills at age 16 are also important factors in determining the likelihood of being employed, although for males, mathematics skill dominates. Again, inclusion of 'soft skill' measures does not cancel out these links. However, inclusion of variables measuring the person's qualification level does substantially reduce the effect of age 16 reading and mathematics. Thus much of the link between age 16 reading and mathematics skill and employment comes via qualification levels. Only a few of the variables included to measure 'soft skills' have statistically significant coefficients in the employment equations, and even here, they are smaller than those of basic literacy and numeracy skills. These findings are mirrored in the wage equations. We found an independent connection between higher earnings and better age 16 reading and mathematics skills, even allowing for a person's 'soft skills'. However, again, including a person's qualification level does reduce this, suggesting much of the reading and mathematics skills association comes via a person's qualification level. Furthermore, as with the results on qualifications and employment, most of the 'soft skills' measures are not particularly important as possible determinants of adult earnings.

Previous research (Dearden *et al*, 2000; McIntosh and Vignoles, 2000) has shown that adults with better basic skills have higher wages and employment. This current research looked at this holding constant both ability at age 16, and qualification level. Thus, we examined the link with adult basic skills, *over and above* age 16 achievements. Adult literacy and numeracy were measured by tests taken at age 37. The results do not reveal any significant connection between *adult* literacy and employment, although in the wage equations such skills seem important. In particular, better adult numeracy skills are associated with higher men's earnings, while literacy is the dominant skill for influencing women's wages. As with the age 16 skills, when we hold constant education level, we do not observe any link with basic skills over and above that of education. Thus most of the connection between adult basic skills and labour market outcomes operates through people with better basic skills also having much better education and qualification levels.

The second question addressed by this research is whether improvements in basic skills go hand in hand with improvements in individuals' labour market outcomes. This question proved more difficult to answer, mainly due to data shortcomings and issues of measurement. The strongest results are found for self-reported skill improvement variables, with both males and females who

say that they have improved their skills earning more in the labour market. In addition, women who report rising skill levels are more likely to be employed, although no such effect can be identified for men. There are, however, very obvious problems with such self report skill improvement measures. It proved much harder to identify any associations between more concrete measures of skill improvement and changes in labour market outcomes. The exception to this is that males who move up the literacy skill distribution, as measured by tests at age 16 and 37, do earn more, while a movement up the numeracy skill distribution improves employment. Note, however, that these effects are most prominent for individuals who already start off quite high up the skills distribution (ie those higher up than the lowest two quintiles). No such effects are observed for women. Low skilled individuals who have undertaken a basic skills course, or who acquired low level qualifications between the ages of 23 and 33 are actually observed to earn less than individuals who do not take such measures to develop their skills. The likely reason for this may well be a bias caused by an issue of sample-selection for which we do not fully control (i.e. it is only the poorest workers who take such low level qualifications or courses). We attempted to control for individuals' abilities by estimating a "changes relationship" in which any fixed effects drop out, but the results remained generally statistically insignificant and very imprecisely estimated, mainly because this was asking too much of the data we have.

Despite these difficulties, analysis of secondary data sources remains the best means of evaluating a specific educational intervention such as the Adult Literacy and Numeracy Strategy, at least until the results of the ongoing more formal evaluation of specific programmes become available. In summary, the level of basic literacy and numeracy skills shows a strong connection with wages and employment. Part of this comes through the fact that people with better basic skills have much better educational achievements at age 16. In some cases, however, we have been able to demonstrate the benefits of improving the level of such skills in adult life, thus identifying an effect over and above the impact on qualifications. We wait to see whether the formal evaluations mentioned above reveal similar benefits for specific literacy and numeracy courses.

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Appendix

Table A1: Summary statistics – NCDS

Variable	Males			Females		
	Mean	(S.D.)	Obs.	Mean	(S.D.)	Obs.
Log hourly wage (1991) larger sample	2.035	(0.429)	3293	1.673	(0.491)	2866
Log hourly wage (1991) 10% sub-sample	2.075	(0.415)	442	1.712	(0.491)	412
Proportion in employment (1991) larger sample	0.915	(0.279)	5545	0.719	(0.449)	5750
Proportion in employment (1991) 10% sub-sample	0.909	(0.287)	738	0.717	(0.451)	858
Log change in wages (1991&1981)	1.002	(1.049)	660	0.672	(1.125)	504
Highest qualification (larger sample)						
None	0.084	(0.278)	3293	0.104	(0.306)	2866
NVQ level 1 or equivalent	0.118	(0.322)	3293	0.128	(0.334)	2866
NVQ level 2 or equivalent	0.293	(0.455)	3293	0.382	(0.486)	2866
NVQ level 3 or equivalent	0.213	(0.450)	3293	0.095	(0.293)	2866
NVQ level 4 or equivalent	0.065	(0.247)	3293	0.104	(0.305)	2866
NVQ level 5 or equivalent	0.227	(0.419)	3293	0.187	(0.390)	2866
*Highest qualification (10% sub- sample***)**						
None	0.070	(0.256)	442	0.085	(0.279)	412
NVQ level 1 or equivalent	0.118	(0.323)	442	0.109	(0.312)	412
NVQ level 2 or equivalent	0.319	(0.467)	442	0.417	(0.494)	412
NVQ level 3 or equivalent	0.197	(0.398)	442	0.097	(0.296)	412
NVQ level 4 or equivalent	0.084	(0.277)	442	0.090	(0.286)	412
NVQ level 5 or equivalent	0.213	(0.450)	442	0.201	(0.402)	412
Test scores at 16						
Math ability at 16 (5^{th} quantile)	0.223	(0.416)	3293	0.152	(0.360)	2866
Math ability at 16 (4^{th} quantile)	0.179	(0.384)	3293	0.158	(0.365)	2866
Math ability at 16 (3^{rd} quantile)	0.153	(0.360)	3293	0.174	(0.379)	2866
Math ability at 16 (2^{nd} quantile)	0.126	(0.332)	3293	0.161	(0.368)	2866
Verbal ability at 16 (5^{th} quantile)	0.203	(0.402)	3293	0.154	(0.361)	2866
Verbal ability at 16 (4^{th} quantile)	0.181	(0.385)	3293	0.179	(0.384)	2866
Verbal ability at 16 (3^{rd} quantile)	0.156	(0.363)	3293	0.177	(0.382)	2866
Verbal ability at 16 (2^{nd} quantile)	0.124	(0.330)	3293	0.161	(0.367)	2866
Adult skills						
Adult Numeracy skills-average (Level 1)	0.233	(0.423)	442	0.255	(0.436)	412
Adult Numeracy skills-good (Level 2+)	0.382	(0.487)	442	0.226	(0.419)	412
Adult Literacy skills-average (Level 1)	0.380	(0.486)	442	0.386	(0.487)	412
Adult Literacy skills-good (Level 2+)	0.493	(0.501)	442	0.405	(0.492)	412
Attitude variables (self-reported)						
School as waste of time	0.071	(0.256)	3293	0.059	(0.236)	2866
I don't get on with my work	0.213	(0.409)	3293	0.194	(0.396)	2866
Homework is a bore	0.419	(0.493)	3293	0.393	(0.489)	2866
Difficult to keep my mind on work	0.261	(0.439)	3293	0.266	(0.442)	2866
I never take work seriously	0.092	(0.289)	3293	0.092	(0.289)	2866
I don't like school	0.206	(0.404)	3293	0.204	(0.403)	2866
There’s no point planning for the future	0.107	(0.309)	3293	0.128	(0.334)	2866
I don’t help the teacher	0.193	(0.395)	3293	0.136	(0.343)	2866
School view						

Proportion of half days absent	0.072	(0.121)	3293	0.093	(0.141)	2866
Destroys property	0.050	(0.218)	3293	0.016	(0.127)	2866
Fights with other children	0.056	(0.231)	3293	0.049	(0.216)	2866
Not liked by other children	0.117	(0.322)	3293	0.092	(0.290)	2866
Tends to be on own	0.242	(0.429)	3293	0.145	(0.353)	2866
Bullies other children	0.048	(0.213)	3293	0.026	(0.159)	2866
Child cautious 5-scale	2.571	(1.567)	3293	2.558	(1.544)	2866
Child moody 5-scale	1.833	(1.400)	3293	1.923	(1.469)	2866
Child timid 5-scale	2.405	(1.425)	3293	2.449	(1.434)	2866
Child unflexible 5-scale	2.141	(1.333)	3293	2.138	(1.326)	2866
Child unsociable 5-scale	1.909	(1.363)	3293	1.788	(1.292)	2866
Child lazy 5-scale	2.133	(1.545)	3293	1.961	(1.455)	2866
Parental view						
Destroys property	0.019	(0.136)	3293	0.006	(0.077)	2866
Fights with other children	0.068	(0.251)	3293	0.088	(0.284)	2866
Not liked by other children	0.030	(0.172)	3293	0.018	(0.132)	2866
Tends to be on own	0.346	(0.476)	3293	0.269	(0.443)	2866
Bullies other children	0.035	(0.184)	3293	0.034	(0.181)	2866
Adult Soft Skills						
Gets on very well with people	0.072	(0.258)	3293	0.093	(0.290)	2866
Trusts most people	0.099	(0.298)	3293	0.113	(0.317)	2866
Argues a lot	0.009	(0.092)	3293	0.007	(0.085)	2866
Usually achieves in life	0.107	(0.309)	3293	0.121	(0.326)	2866
Feels life is under their control	0.120	(0.325)	3293	0.131	(0.337)	2866
Good caring skills	0.026	(0.160)	3293	0.082	(0.274)	2866

Table A2: Determinants of highest qualification for males by age 33: dependent variable qualification level (6 ordered categories)

	(1)		(2)		(3)	
Family background:						
Father's years of education	0.066***	(0.010)	0.059***	(0.011)	0.059***	(0.011)
Mother's years of education	0.025**	(0.012)	0.027**	(0.012)	0.027**	(0.012)
Bad financial situation dummy (childhood)	-0.193***	(0.038)	-0.159***	(0.038)	-0.159***	(0.039)
Parental occupation:						
Intermediate	0.019	(0.053)	0.000	(0.054)	-0.001	(0.054)
Skilled non-manual	0.091	(0.064)	0.070	(0.065)	0.070	(0.065)
Skilled manual	-0.048	(0.047)	-0.056	(0.048)	-0.061	(0.048)
Semi-skilled non-man	-0.160	(0.144)	-0.199	(0.146)	-0.196	(0.146)
Semi-skilled manual	-0.067	(0.060)	-0.101	(0.062)	-0.098	(0.062)
Parental interest:						
Father expects too much	0.307**	(0.134)	0.266**	(0.134)	0.254*	(0.135)
Very interested	0.081*	(0.047)	0.218	(0.048)	0.034	(0.048)
Some interest	0.093***	(0.038)	0.076**	(0.038)	0.059	(0.038)
Mother expects too much	0.416***	(0.088)	0.372***	(0.089)	0.304***	(0.090)
Very interested	0.255***	(0.046)	0.060***	(0.048)	0.140***	(0.050)
Some interest	0.102***	(0.037)	0.098***	(0.038)	0.034	(0.040)
Test scores:						
Bristol Social Aptitude Guide (total score at 7)	-0.012***	(0.002)	-0.011***	(0.002)	-0.010***	(0.002)
Math ability at 16 (5^{th} quintile)	0.953***	(0.066)	0.723***	(0.068)	0.664***	(0.069)
Math ability at 16 (4^{th} quintile)	0.517***	(0.060)	0.365***	(0.062)	0.325***	(0.062)
Math ability at 16 (3^{rd} quintile)	0.332***	(0.057)	0.255***	(0.058)	0.228***	(0.058)
Math ability at 16 (2^{nd} quintile)	0.103*	(0.057)	0.079	(0.058)	0.072	(0.058)
Verbal ability at 16 (5^{th} quintile)	0.800***	(0.064)	0.724***	(0.066)	0.662***	(0.067)
Verbal ability at 16 (4^{th} quintile)	0.592***	(0.059)	0.551***	(0.061)	0.500***	(0.061)
Verbal ability at 16 (3^{rd} quintile)	0.432***	(0.056)	0.403***	(0.058)	0.363***	(0.058)
Verbal ability at 16 (2^{nd} quintile)	0.361***	(0.055)	0.345***	(0.056)	0.319***	(0.056)
Type of school attended:						
Secondary Modern	-0.029	(0.039)	-0.046	(0.039)	-0.044	(0.039)
Grammar School	0.120**	(0.055)	0.161***	(0.056)	0.140**	(0.057)
Private School	0.260***	(0.067)	0.286***	(0.069)	0.285***	(0.069)
Other School	-0.366***	(0.090)	-0.365***	(0.093)	-0.353***	(0.093)
Current region of residence:						
North	2.347***	(0.069)	2.378***	(0.070)	2.346***	(0.070)
North West	2.373***	(0.053)	2.403***	(0.054)	2.395***	(0.054)
Yorkshire & Humberside	2.354***	(0.054)	2.375***	(0.055)	2.373***	(0.055)
West Midlands	2.336***	(0.056)	2.374***	(0.056)	2.366***	(0.056)
East Midlands	2.338***	(0.060)	2.372***	(0.061)	2.362***	(0.061)
East Anglia	2.369***	(0.085)	2.374***	(0.086)	2.368***	(0.086)
South West	2.382***	(0.058)	2.410***	(0.059)	2.420***	(0.059)
South East	2.401***	(0.042)	2.439***	(0.043)	2.442***	(0.043)
Wales	2.187***	(0.069)	2.257***	(0.070)	2.242***	(0.071)
Scotland	2.310***	(0.059)	2.374***	(0.060)	2.362***	(0.061)
Attitude variables (self-reported):						
I don't help the teacher			-0.023	(0.037)	-0.024	(0.037)
I don't like school			-0.050	(0.041)	-0.057	(0.041)
I don't get on with my work			-0.022	(0.037)	-0.023	(0.037)
Difficult to keep my mind on work			-0.065 *	(0.036)	-0.063*	(0.036)
Homework is a bore			-0.119***	(0.035)	-0.122***	(0.035)
I never take work seriously			-0.100*	(0.052)	-0.101**	(0.052)
There's no point planning for the future			-0.058	(0.046)	-0.054	(0.046)

School as waste of time		-0.118**	(0.057)	-0.115**	(0.057)
Parental view:					
Bullies other children		-0.185**	(0.077)	-0.182**	(0.077)
Not liked by other children		-0.072	(0.085)	-0.066	(0.085)
Destroys property		-0.188*	(0.097)	-0.184*	(0.097)
Fights with other children		0.018	(0.057)	0.011	(0.057)
Tends to be on own		0.060*	(0.032)	0.065**	(0.032)
School view:					
Proportion of half days absent		-0.732***	(0.133)	-0.727***	(0.133)
Bullies other children		-0.042	(0.076)	-0.040	(0.076)
Child cautious 5-scale		-0.024	(0.021)	-0.022	(0.021)
Child lazy 5-scale		-0.103***	(0.016)	-0.105***	(0.016)
Child moody 5-scale		-0.009	(0.017)	-0.012	(0.017)
Not liked by other children		0.061	(0.051)	0.057	(0.051)
Child unflexible 5-scale		-0.015	(0.023)	-0.015	(0.023)
Child timid 5-scale		-0.046*	(0.026)	-0.040	(0.026)
Child unsociable 5-scale		0.020	(0.019)	0.022	(0.019)
Destroys property		-0.017	(0.072)	-0.024	(0.072)
Fights with other children		-0.159**	(0.075)	-0.154**	(0.075)
Tends to be on own		-0.046	(0.041)	-0.047	(0.041)
Age 7 ability:					
Math ability at 7 (2^{nd} quintile)				0.052	(0.046)
Math ability at 7 (3^{rd} quintile)				0.143***	(0.046)
Math ability at 7 (4^{th} quintile)				0.101**	(0.048)
Math ability at 7 (5^{th} quintile)				0.194***	(0.050)
Verbal ability at 7 (2^{nd} quintile)				0.057	(0.044)
Verbal ability at 7 (3^{rd} quintile)				0.088*	(0.047)
Verbal ability at 7 (4^{th} quintile)				0.130**	(0.051)
Verbal ability at 7 (5^{th} quintile)				0.122**	(0.055)
Observations	9585	9585		9585	

Where appropriate, missing value dummy variables are included for each variable.
Standard errors in parentheses
* significant at 10% level; ** significant at 5% level; *** significant at 1% level

Table A3: Determinants of highest qualification for females by age 33: dependent variable qualification level (6 ordered categories)

	(1)		(2)		(3)	
Family background:						
Father's years of education	0.041***	(0.010)	0.040***	(0.010)	0.041***	(0.010)
Mother's years of education	0.061***	(0.012)	0.055***	(0.012)	0.056***	(0.012)
Bad financial situation dummy (childhood)	-0.222***	(0.037)	-0.167***	(0.037)	-0.171***	(0.037)
Parental occupation:						
Intermediate	0.050	(0.052)	0.043	(0.052)	0.051	(0.052)
Skilled non-manual	0.048	(0.064)	0.053	(0.065)	0.061	(0.065)
Skilled manual	-0.018	(0.046)	-0.007	(0.046)	0.001	(0.047)
Semi-skilled non-man	-0.041	(0.143)	-0.012	(0.145)	-0.007	(0.145)
Semi-skilled manual	-0.064	(0.059)	-0.056	(0.060)	-0.059	(0.060)
Parental interest:						
Father expects too much	0.431***	(0.147)	0.297***	(0.148)	0.369**	(0.148)
Very interested	0.148***	(0.044)	0.254***	(0.045)	0.117***	(0.045)
Some interest	0.015	(0.038)	0.014	(0.039)	0.031	(0.039)
Mother expects too much	0.335***	(0.101)	0.398***	(0.103)	0.196*	(0.104)
Very interested	0.260***	(0.044)	0.150***	(0.045)	0.116**	(0.048)
Some interest	0.119***	(0.037)	0.127***	(0.039)	-0.007	(0.041)
Test scores:						
Bristol Social Aptitude Guide (total score at 7)	-0.012***	(0.002)	-0.010***	(0.002)	-0.009***	(0.002)
Math ability at 16 (5^{th} quintile)	0.826***	(0.066)	0.620***	(0.068)	0.542***	(0.069)
Math ability at 16 (4^{th} quintile)	0.441***	(0.057)	0.306***	(0.058)	0.263***	(0.058)
Math ability at 16 (3^{rd} quintile)	0.241***	(0.051)	0.150***	(0.052)	0.133**	(0.052)
Math ability at 16 (2^{nd} quintile)	0.144***	(0.049)	0.111**	(0.050)	0.106**	(0.050)
Verbal ability at 16 (5^{th} quintile)	0.971***	(0.067)	0.872***	(0.069)	0.772***	(0.070)
Verbal ability at 16 (4^{th} quintile)	0.834***	(0.060)	0.729***	(0.062)	0.651***	(0.063)
Verbal ability at 16 (3^{rd} quintile)	0.653***	(0.055)	0.574***	(0.057)	0.515***	(0.058)
Verbal ability at 16 (2^{nd} quintile)	0.404***	(0.053)	0.354***	(0.054)	0.310***	(0.055)
Type of school attended:						
Secondary Modern	-0.039	(0.039)	-0.053	(0.040)	-0.040	(0.040)
Grammar School	0.097*	(0.051)	0.152***	(0.052)	0.126**	(0.053)
Private School	0.202***	(0.067)	0.212***	(0.068)	0.209***	(0.068)
Other School	-0.509***	(0.110)	-0.493***	(0.111)	-0.470***	(0.111)
Current region of residence:						
North	1.912***	(0.070)	1.972***	(0.071)	1.932***	(0.071)
North West	2.093***	(0.052)	2.138***	(0.053)	2.128***	(0.053)
Yorkshire & Humberside	1.986***	(0.054)	2.017***	(0.054)	2.001***	(0.055)
West Midlands	2.043***	(0.057)	2.068***	(0.057)	2.065***	(0.057)
East Midlands	1.962***	(0.064)	1.990***	(0.065)	1.980***	(0.065)
East Anglia	1.985***	(0.079)	2.044***	(0.080)	2.036***	(0.080)
South West	2.010***	(0.057)	2.046***	(0.057)	2.033***	(0.057)
South East	2.100***	(0.042)	2.139***	(0.042)	2.138***	(0.042)
Wales	1.987***	(0.068)	2.053***	(0.069)	2.042***	(0.070)
Scotland	2.184***	(0.058)	2.241***	(0.058)	2.215***	(0.059)
Attitude variables (self-reported):						
I don't help the teacher			0.038	(0.042)	0.036	(0.042)
I don't like school			-0.205***	(0.040)	-0.213***	(0.040)
I don't get on with my work			-0.033	(0.039)	-0.039	(0.039)
Difficult to keep my mind on work			-0.076**	(0.036)	-0.089**	(0.036)
Homework is a bore			-0.071**	(0.034)	-0.073**	(0.034)
I never take work seriously			-0.022	(0.052)	-0.020	(0.053)
There's no point planning for the future			-0.026	(0.043)	-0.022	(0.043)
School as waste of time			-0.150**	(0.063)*	-0.142**	(0.063)
Parental view:						
Bullies other children			-0.028	(0.078)	-0.031	(0.078)

Not liked by other children		-0.031	(0.100)	-0.020	(0.100)
Destroys property		0.183	(0.148)	0.186	(0.149)
Fights with other children		-0.022	(0.052)	-0.028	(0.052)
Tends to be on own		0.007	(0.033)	0.019	(0.033)
School view:					
Proportion of half days absent		-0.759***	(0.118)	-0.760***	(0.118)
Bullies other children		-0.167	(0.109)	-0.145	(0.109)
Child cautious 5-scale		-0.029	(0.021)	-0.029	(0.021)
Child lazy 5-scale		-0.084***	(0.017)	-0.085***	(0.017)
Child moody 5-scale		0.010	(0.016)	0.007	(0.016)
Not liked by other children		-0.088	(0.057)	-0.087	(0.057)
Child unflexible 5-scale		-0.055**	(0.022)	-0.052**	(0.022)
Child timid 5-scale		-0.079***	(0.026)	-0.071***	(0.026)
Child unsociable 5-scale		0.002	(0.019)	-0.001	(0.019)
Destroys property		0.080	(0.125)	0.076	(0.125)
Fights with other children		-0.112	(0.085)	-0.119	(0.085)
Tends to be on own		0.027	(0.047)	0.034	(0.047)
Age 7 ability:					
Math ability at 7 (2^{nd} quintile)				0.039	(0.045)
Math ability at 7 (3^{rd} quintile)				0.096**	(0.046)
Math ability at 7 (4^{th} quintile)				0.151***	(0.048)
Math ability at 7 (5^{th} quintile)				0.225***	(0.051)
Verbal ability at 7 (2^{nd} quintile)				0.101**	(0.049)
Verbal ability at 7 (3^{rd} quintile)				0.116**	(0.051)
Verbal ability at 7 (4^{th} quintile)				0.188***	(0.051)
Verbal ability at 7 (5^{th} quintile)				0.294***	(0.054)
Observations	8946	8946		8946	

Where appropriate, missing value dummy variables are included for each variable.
Standard errors in parentheses
* significant at 10% level; ** significant at 5% level; *** significant at 1% level

Table A4: 1991 employment status and age 16 reading and mathematics tests for males: dependent variable 0-1 employment dummy

	(1)		(2)		(3)	
Family background:						
Father's years of education	0.002	(0.003)	0.001	(0.003)	0.001	(0.003)
Mother's years of education	-0.002	(0.003)	-0.002	(0.003)	-0.003	(0.003)
Bad financial situation dummy (childhood)	-0.031***	(0.010)	-0.024***	(0.010)	-0.019**	(0.003)
Parental occupation:						
Intermediate	0.004	(0.013)	0.003	(0.012)	0.001	(0.010)
Skilled non-manual	0.006	(0.016)	0.005	(0.014)	0.000	(0.012)
Skilled manual	-0.010	(0.011)	-0.009	(0.010)	-0.009	(0.008)
Semi-skilled non-man	0.028	(0.022)	0.032*	(0.016)	0.032***	(0.010)
Semi-skilled manual	0.002	(0.014)	0.001	(0.013)	0.000	(0.010)
Parental interest:						
Father expects too much	-0.027	(0.040)	-0.027	(0.044)	0.037	(0.031)
Very interested	0.013	(0.010)	0.010	(0.044)	0.021	(0.008)
Some interest	0.002	(0.009)	0.001	(0.009)	-0.001	(0.007)
Mother expects too much	0.047***	(0.011)	0.040**	(0.012)	0.037**	(0.013)
Very interested	0.026**	(0.001)	0.023**	(0.011)	0.021*	(0.011)
Some interest	0.022***	(0.008)	0.021**	(0.008)	0.020**	(0.008)
Test scores:						
Bristol Social Aptitude Guide (total score at 7)	-0.002***	(0.000)	-0.001***	(0.000)	-0.001***	(0.000)
Math ability at 16 (5^{th} quintile)	0.066***	(0.010)	0.055***	(0.010)	0.048***	(0.011)
Math ability at 16 (4^{th} quintile)	0.049***	(0.009)	0.041***	(0.010)	0.034***	(0.011)
Math ability at 16 (3^{rd} quintile)	0.031***	(0.010)	0.026**	(0.010)	0.018***	(0.006)
Math ability at 16 (2^{nd} quintile)	0.010	(0.014)	0.010	(0.011)	0.005	(0.011)
Verbal ability at 16 (5^{th} quintile)	-0.005	(0.022)	-0.017	(0.021)	-0.030*	(0.016)
Verbal ability at 16 (4^{th} quintile)	0.026**	(0.009)	0.018	(0.012)	0.006	(0.013)
Verbal ability at 16 (3^{rd} quintile)	0.015	(0.014)	0.008	(0.015)	-0.006	(0.013)
Verbal ability at 16 (2^{nd} quintile)	0.018	(0.012)	0.011	(0.013)	0.001	(0.012)
Type of school attended:						
Secondary Modern	0.016*	(0.009)	0.018*	(0.008)	0.017*	(0.008)
Grammar School	0.006	(0.017)	0.011	(0.016)	0.012	(0.015)
Private School	0.005	(0.021)	0.008	(0.020)	0.007	(0.020)
Other School	-0.108***	(0.033)	-0.098***	(0.033)	-0.076***	(0.031)
Current region of residence:						
North	0.002	(0.029)	0.002	(0.024)	0.001	(0.018)
North West	-0.012	(0.026)	-0.012	(0.022)	-0.013	(0.016)
Yorkshire & Humberside	-0.015	(0.026)	-0.015	(0.022)	-0.015	(0.016)
West Midlands	0.035**	(0.119)	0.036**	(0.011)	0.035**	(0.011)
East Midlands	0.008	(0.026)	0.008	(0.021)	0.008	(0.015)
East Anglia	0.021	(0.028)	0.019	(0.023)	0.019	(0.015)
South West	0.013	(0.024)	0.013	(0.020)	0.010	(0.015)
South East	0.008	(0.022)	0.008	(0.019)	0.005	(0.014)
Wales	-0.016	(0.032)	-0.015	(0.027)	-0.014	(0.020)
Scotland	0.008	(0.026)	0.012	(0.021)	0.015	(0.013)
Attitude variables (self-reported):						
I don't help the teacher			0.009	(0.010)	0.008	(0.008)
I don't like school			0.002	(0.013)	0.004	(0.009)
I don't get on with my work			-0.015	(0.010)	-0.014**	(0.007)
Difficult to keep my mind on work			-0.005	(0.012)	-0.002	(0.009)
Homework is a bore			0.007	(0.011)	0.009	(0.007)
I never take work seriously			-0.001	(0.015)	0.002	(0.011)
There's no point planning for the future			-0.007	(0.014)	-0.005	(0.011)

School as waste of time		-0.016	(0.017)	-0.012	(0.012)
Parental view:					
Bullies other children		0.017*	(0.008)	0.019	(0.013)
Not liked by other children		0.009	(0.022)	0.008	(0.019)
Destroys property		-0.009	(0.030)	-0.004	(0.025)
Fights with other children		-0.020**	(0.007)	-0.019	(0.014)
Tends to be on own		0.002	(0.011)	0.002	(0.009)
School view:					
Proportion of half days absent		-0.052*	(0.027)	-0.039	(0.027)
Bullies other children		-0.029	(0.019)	-0.024	(0.014)
Child cautious 5-scale		0.003	(0.005)	0.003	(0.005)
Child lazy 5-scale		-0.001	(0.004)	0.000	(0.004)
Child moody 5-scale		-0.005	(0.004)	-0.005	(0.004)
Not liked by other children		0.009	(0.013)	0.007	(0.011)
Child unflexible 5-scale		0.005	(0.006)	0.004	(0.005)
Child timid 5-scale		0.004	(0.006)	0.006	(0.006)
Child unsociable 5-scale		-0.007	(0.005)	-0.007	(0.005)
Destroys property		-0.009	(0.021)	-0.008	(0.016)
Fights with other children		-0.013	(0.022)	-0.010	(0.017)
Tends to be on own		-0.008	(0.013)	-0.005	(0.010)
Level of qualification:					
NVQ Level 1 or equivalent				0.036***	(0.007)
NVQ Level 2 or equivalent				0.046***	(0.008)
NVQ Level 3 or equivalent				0.057***	(0.007)
NVQ Level 4 or equivalent				0.043***	(0.009)
NVQ Level 5 or equivalent				0.055***	(0.009)
Age 7 ability:					
Math ability at 7 (2^{nd} quintile)				0.001	(0.014)
Math ability at 7 (3^{rd} quintile)				0.012	(0.010)
Math ability at 7 (4^{th} quintile)				0.001	(0.015)
Math ability at 7 (5^{th} quintile)				0.021*	(0.011)
Verbal ability at 7 (2^{nd} quintile)				-0.010	(0.011)
Verbal ability at 7 (3^{rd} quintile)				0.009	(0.011)
Verbal ability at 7 (4^{th} quintile)				-0.019	(0.014)
Verbal ability at 7 (5^{th} quintile)				-0.033**	(0.017)
Observations	5545	5545		5545	

Marginal effects dF/dx reported.
Where appropriate, missing value dummy variables are included for each variable.
Standard errors in parentheses
* significant at 10% level; ** significant at 5% level; *** significant at 1% level

Table A5: 1991 employment status and age 16 reading and mathematics tests for females: dependent variable 0-1 employment

	(1)		(2)		(3)	
Family background:						
Father's years of education	0.000	(0.005)	0.000	(0.005)	-0.002	(0.005)
Mother's years of education	0.000	(0.005)	0.000	(0.005)	-0.003	(0.005)
Bad financial situation dummy (childhood)	0.012	(0.016)	0.018	(0.017)	0.029*	(0.015)
Parental occupation:						
Intermediate	0.027	(0.022)	0.024	(0.023)	0.020	(0.022)
Skilled non-manual	0.037	(0.028)	0.036	(0.028)	0.034	(0.026)
Skilled manual	0.035*	(0.020)	0.036*	(0.020)	0.036*	(0.019)
Semi-skilled non-man	-0.010	(0.064)	-0.007	(0.064)	0.002	(0.060)
Semi-skilled manual	0.022	(0.026)	0.024	(0.026)	0.027	(0.025)
Parental interest:						
Father expects too much	0.075	(0.063)	0.019	(0.066)	0.003	(0.045)
Very interested	0.009	(0.021)	0.004	(0.022)	-0.005	(0.022)
Some interest	0.002	(0.018)	0.014	(0.018)	0.002	(0.017)
Mother expects too much	0.018	(0.046)	0.061	(0.046)	0.039	(0.065)
Very interested	0.033	(0.021)	0.027	(0.021)	0.003	(0.021)
Some interest	0.020	(0.017)	-0.002	(0.018)	-0.005	(0.018)
Test scores:						
Bristol Social Aptitude Guide (total score at 7)	-0.002***	(0.001)	-0.002***	(0.001)	-0.001*	(0.001)
Math ability at 16 (5^{th} quintile)	0.050*	(0.029)	0.044	(0.030)	0.011	(0.030)
Math ability at 16 (4^{th} quintile)	0.012	(0.026)	0.004	(0.027)	-0.016	(0.026)
Math ability at 16 (3^{rd} quintile)	0.064***	(0.021)	0.057***	(0.022)	0.049**	(0.020)
Math ability at 16 (2^{nd} quintile)	0.043**	(0.022)	0.043**	(0.021)	0.036*	(0.020)
Verbal ability at 16 (5^{th} quintile)	0.074***	(0.028)	0.074***	(0.029)	0.022	(0.030)
Verbal ability at 16 (4^{th} quintile)	0.068***	(0.026)	0.061**	(0.027)	0.017	(0.028)
Verbal ability at 16 (3^{rd} quintile)	0.038	(0.025)	0.034	(0.026)	-0.005	(0.026)
Verbal ability at 16 (2^{nd} quintile)	0.041*	(0.024)	0.040*	(0.024)	0.015	(0.023)
Type of school attended:						
Secondary Modern	-0.019	(0.018)	-0.019	(0.018)	-0.018	(0.018)
Grammar School	0.012	(0.024)	0.014	(0.024)	0.005	(0.024)
Private School	-0.023	(0.032)	-0.019	(0.032)	-0.029	(0.033)
Other School	-0.148***	(0.050)	-0.141***	(0.051)	-0.102**	(0.050)
Current region of residence:						
North	-0.024	(0.040)	-0.022	(0.040)	-0.010	(0.036)
North West	-0.030	(0.033)	-0.028	(0.033)	-0.023	(0.030)
Yorkshire & Humberside	-0.081***	(0.033)	-0.083***	(0.034)	-0.072**	(0.031)
West Midlands	0.058**	(0.032)	0.058*	(0.032)	0.066**	(0.026)
East Midlands	-0.039	(0.037)	-0.038	(0.038)	-0.025	(0.034)
East Anglia	-0.008	(0.043)	-0.007	(0.043)	0.003	(0.038)
South West	0.017	(0.033)	0.015	(0.033)	0.020	(0.030)
South East	-0.076***	(0.029)	-0.075***	(0.029)	-0.070***	(0.026)
Wales	-0.086**	(0.039)	-0.084**	(0.039)	-0.076**	(0.036)
Scotland	0.041	(0.032)	0.038	(0.032)	0.043	(0.028)
Attitude variables (self-reported):						
I don't help the teacher			-0.030	(0.020)	-0.035*	(0.019)
I don't like school			-0.034*	(0.019)	-0.025	(0.018)
I don't get on with my work			0.005	(0.019)	0.007	(0.017)
Difficult to keep my mind on work			0.018	(0.017)	0.022	(0.015)
Homework is a bore			-0.017	(0.017)	-0.013	(0.015)
I never take work seriously			0.033	(0.024)	0.038*	(0.021)
There's no point planning for the future			0.001	(0.020)	0.007	(0.018)

School as waste of time		-0.033	(0.030)	-0.025	(0.027)
Parental view:					
Bullies other children		0.035	(0.033)	0.038	(0.031)
Not liked by other children		0.024	(0.045)	0.029	(0.042)
Destroys property		-0.082	(0.072)	-0.090	(0.071)
Fights with other children		-0.031	(0.024)	-0.031	(0.022)
Tends to be on own		-0.039***	(0.014)	-0.036**	(0.013)
School view:					
Proportion of half days absent		-0.079	(0.048)	-0.031	(0.049)
Bullies other children		-0.021	(0.049)	-0.013	(0.044)
Child cautious 5-scale		0.005	(0.010)	0.006	(0.010)
Child lazy 5-scale		0.002	(0.008)	0.007	(0.008)
Child moody 5-scale		0.012	(0.007)	0.013*	(0.007)
Not liked by other children		-0.029	(0.027)	-0.028	(0.025)
Child unflexible 5-scale		-0.010	(0.010)	-0.009	(0.010)
Child timid 5-scale		-0.014	(0.011)	-0.010	(0.011)
Child unsociable 5-scale		0.005	(0.009)	0.006	(0.009)
Destroys property		0.002	(0.055)	0.001	(0.051)
Fights with other children		-0.003	(0.038)	0.003	(0.035)
Tends to be on own		-0.017	(0.022)	-0.018	(0.020)
Level of qualification:					
NVQ Level 1 or equivalent				0.070***	(0.021)
NVQ Level 2 or equivalent				0.120***	(0.020)
NVQ Level 3 or equivalent				0.112***	(0.023)
NVQ Level 4 or equivalent				0.171***	(0.019)
NVQ Level 5 or equivalent				0.194***	(0.019)
Age 7 ability:					
Math ability at 7 (2^{nd} quintile)				0.025	(0.018)
Math ability at 7 (3^{rd} quintile)				0.011	(0.020)
Math ability at 7 (4^{th} quintile)				0.023	(0.020)
Math ability at 7 (5^{th} quintile)				0.038*	(0.019)
Verbal ability at 7 (2^{nd} quintile)				0.021	(0.021)
Verbal ability at 7 (3^{rd} quintile)				0.015	(0.022)
Verbal ability at 7 (4^{th} quintile)				-0.012	(0.024)
Verbal ability at 7 (5^{th} quintile)				0.011	(0.025)
Observations	5750	5750		5750	

Marginal effects dF/dx reported.
Where appropriate, missing value dummy variables are included for each variable.
Standard errors in parentheses
* significant at 10% level; ** significant at 5% level; *** significant at 1% level

Table A6: 1991 employment status and adult literacy/numeracy for males: dependent variable 0-1 employment dummy

	(1)		(2)		(3)	
Family background:						
Father's years of education	0.002	(0.007)	0.000	(0.008)	0.000	(0.008)
Mother's years of education	0.002	(0.010)	0.001	(0.032)	0.000	(0.009)
Bad financial situation dummy (childhood)	0.003	(0.024)	0.000	(0.015)	0.004	(0.224)
Parental occupation:						
Intermediate	-0.018	(0.043)	-0.025	(0.939)	-0.021	(1.056)
Skilled non-manual	-0.027	(0.055)	-0.072*	(2.339)	-0.061	(2.705)
Skilled manual	-0.013	(0.036)	-0.012	(0.448)	-0.011	(0.572)
Semi-skilled non-man	-0.018	(0.049)	-0.022	(0.838)	-0.016	(0.815)
Parental interest:						
Father expects too much	-	-	-	-	-	-
Very interested	-0.081*	(0.052)	-0.036	(1.310)	-0.039*	(1.909)
Some interest	-0.032	(0.031)	-0.019	(0.717)	0.005*	(0.936)
Mother expects too much	0.035	(0.028)	0.018	(0.798)	0.011	(0.637)
Very interested	0.054*	(0.026)	0.024	(0.998)	-0.039	(1.022)
Some interest	0.025	(0.021)	0.015	(0.629)	-0.018	(0.296)
Test scores:						
Bristol Social Aptitude Guide (total score at 7)	-0.002**	(0.001)	-0.001**	(0.048)	-0.001**	(0.054)
Math ability at 16 (5^{th} quintile)	0.038	(0.033)	0.022	(0.918)	0.020	(1.138)
Math ability at 16 (4^{th} quintile)	0.033	(0.030)	0.025	(1.064)	0.019	(1.087)
Math ability at 16 (3^{rd} quintile)	0.029	(0.027)	0.019	(0.834)	0.015	(0.872)
Math ability at 16 (2^{nd} quintile)	0.042	(0.021)	0.025**	(1.085)	0.020**	(1.194)
Verbal ability at 16 (5^{th} quintile)	0.005	(0.042)	-0.005	(0.202)	0.000	(0.030)
Verbal ability at 16 (4^{th} quintile)	0.040	(0.028)	0.023	(0.973)	0.020	(1.169)
Verbal ability at 16 (3^{rd} quintile)	0.011	(0.033)	0.007	(0.290)	0.008	(0.466)
Verbal ability at 16 (2^{nd} quintile)	0.007	(0.033)	-0.004	(0.162)	-0.005	(0.280)
Type of school attended:						
Secondary Modern	0.030	(0.020)	0.007	(0.302)	-0.001	(0.048)
Grammar School	-0.003	(0.042)	-0.006	(0.228)	-0.009	(0.483)
Private School	0.004	(0.065)	0.007	(0.278)	-0.005	(0.258)
Other School	-0.019	(0.058)	-0.053	(1.789)	-0.065	(2.853)
Current region of residence:						
North	-0.049	(0.079)	-0.023	(0.862)	-0.014	(0.735)
North West	-0.004	(0.053)	0.000	(0.032)	0.007	(0.424)
Yorkshire & Humberside	0.009	(0.048)	0.001	(0.041)	0.002	(0.109)
West Midlands	0.018	(0.043)	0.012	(0.501)	0.012	(0.720)
East Midlands	-0.011	(0.059)	-0.005	(0.196)	0.001	(0.067)
East Anglia	-0.067	(0.098)	-0.023	(0.843)	0.001	(0.064)
South West	0.010	(0.049)	0.016	(0.710)	0.016	(0.957)
South East	0.046	(0.040)	0.026	(1.060)	0.025	(1.383)
Wales	-	-	-	-	-	-
Scotland	0.057	(0.018)	0.025	(1.164)	0.019	(1.157)
Adult skills:						
Adult Numeracy skills-average (Level 1)	0.038*	(0.019)	0.015	(0.632)	0.010	(0.547)
Adult Numeracy skills-good (Level 2+)	0.048*	(0.023)	0.014	(0.581)	0.008	(0.458)
Adult Literacy skills-average (Level 1)	0.040*	(0.021)	0.021*	(0.849)	0.016	(0.874)
Adult Literacy skills-good (Level 2+)	0.047*	(0.028)	0.022	(0.868)	0.013	(0.731)
Attitude variables (self-reported):						

I don’t help the teacher	0.020*	(0.858)	0.012	(0.704)
I don't like school	0.002	(0.077)	-0.001	(0.048)
I don't get on with my work	-0.027	(1.022)	-0.026	(1.305)
Difficult to keep my mind on work	-0.047***	(1.693)	-0.032**	(1.614)
Homework is a bore	0.002	(0.081)	0.002	(0.127)
I never take work seriously	0.008	(0.344)	0.009	(0.512)
There’s no point planning for the future	0.015	(0.664)	0.014	(0.821)
School as waste of time	-0.025	(0.909)	-0.008	(0.445)
Parental view:				
Bullies other children	0.012	(0.530)	0.008	(0.464)
Not liked by other children	0.018	(0.802)	0.014	(0.839)
Destroys property	0.017	(0.773)	0.015	(0.949)
Fights with other children	0.008	(0.332)	0.011	(0.638)
Tends to be on own	0.000	(0.018)	-0.003	(0.165)
School view:				
Proportion of half days absent	-0.038	(1.519)	-0.011	(0.582)
Bullies other children	-0.051	(1.730)	-0.022	(1.089)
Child cautious 5-scale	0.003	(0.133)	0.008	(0.465)
Child lazy 5-scale	0.009	(0.366)	0.008	(0.455)
Child moody 5-scale	-0.014*	(0.544)	-0.008	(0.445)
Not liked by other children	0.018	(0.766)	0.010	(0.606)
Child unflexible 5-scale	0.011	(0.427)	0.009	(0.517)
Child timid 5-scale	0.014	(0.561)	0.010	(0.577)
Child unsociable 5-scale	0.004	(0.561)	0.001	(0.033)
Destroys property	0.014	(0.583)	0.006	(0.352)
Fights with other children	0.023	(1.033)	0.018*	(1.084)
Tends to be on own	-0.014	(0.547)	-0.007	(0.165)
Adult Soft Skills:				
Usually achieves in life	0.056***	(0.056)	0.047***	(2.259)
Argues a lot	-0.008	(0.311)	0.000	(0.023)
Good caring skills	-0.008	(0.299)	-0.002	(0.124)
Feels life is under their control	-0.016	(0.678)	-0.014	(0.819)
Gets on very well with people	-0.008	(0.318)	-0.008	(0.447)
Trusts most people	0.026**	(1.000)	0.024**	(1.242)
Level of qualification:				
NVQ Level 1 or equivalent			0.014	(0.846)
NVQ Level 2 or equivalent			0.028***	(1.534)
NVQ Level 3 or equivalent			0.020**	(1.159)
NVQ Level 4 or equivalent			0.002	(0.128)
NVQ Level 5 or equivalent			0.028**	(1.595)
Age 7 ability:				
Math ability at 7 (2^{nd} quintile)			0.008	(0.447)
Math ability at 7 (3^{rd} quintile)			-0.002	(0.091)
Math ability at 7 (4^{th} quintile)			-0.025	(1.240)
Math ability at 7 (5^{th} quintile)			-0.002	(0.108)
Verbal ability at 7 (2^{nd} quintile)			0.015	(0.883)
Verbal ability at 7 (3^{rd} quintile)			0.013	(0.742)
Verbal ability at 7 (4^{th} quintile)			0.007	(0.396)
Verbal ability at 7 (5^{th} quintile)			0.003	(0.142)
Observations	716	709	709	

Marginal effects dF/dx reported.
Where appropriate, missing value dummy variables are included for each variable.
Standard errors in parentheses
* significant at 10% level; ** significant at 5% level; *** significant at 1% level

Table A7: 1991 employment status and adult literacy/numeracy for females: dependent variable 0-1 employment dummy

	(1)		(2)		(3)	
Family background:						
Father's years of education	-0.003	(0.012)	-0.007	(0.057)	-0.014	(0.123)
Mother's years of education	0.008	(0.013)	0.003	(0.030)	0.007	(0.059)
Bad financial situation dummy (childhood)	-0.009	(0.044)	0.009	(0.082)	0.018	(0.170)
Parental occupation:						
Intermediate	0.005	(0.059)	-0.001	(0.060)	0.003	(0.061)
Skilled non-manual	0.021	(0.072)	0.035	(0.311)	0.033	(0.315)
Skilled manual	-0.015	(0.055)	0.008	(0.084)	0.007	(0.078)
Semi-skilled non-man	0.012	(0.161)	-0.074	(0.539)	-0.068	(0.563)
Semi-skilled manual	-0.119	(0.079)	-0.088	(0.607)	-0.094	(0.718)
Parental interest:						
Father expects too much	0.159	(0.117)	0.125	(1.316)	0.133	(1.357)
Very interested	-0.037	(0.054)	-0.048	(0.375)	-0.059	(0.539)
Some interest	-0.101**	(0.050)	-0.101**	(0.242)	-0.120***	(0.930)
Mother expects too much	0.130	(0.092)	0.148	(1.671)	0.122	(1.448)
Very interested	0.012	(0.052)	0.037	(0.314)	0.059	(0.496)
Some interest	0.038	(0.045)	0.029	(0.718)	0.043	(0.391)
Test scores:						
Bristol Social Aptitude Guide (total score at 7)	-0.001	(0.002)	-0.001	(0.012)	-0.001	(0.010)
Math ability at 16 (5^{th} quintile)	0.079	(0.074)	0.076	(0.696)	0.076	(0.746)
Math ability at 16 (4^{th} quintile)	0.022	(0.066)	0.022	(0.195)	0.031	(0.286)
Math ability at 16 (3^{rd} quintile)	0.101*	(0.054)	0.088	(0.813)	0.100*	(1.006)
Math ability at 16 (2^{nd} quintile)	0.051	(0.057)	0.068	(0.604)	0.067	(0.637)
Verbal ability at 16 (5^{th} quintile)	0.020	(0.080)	0.066	(0.582)	0.012	(0.137)
Verbal ability at 16 (4^{th} quintile)	-0.059	(0.078)	0.002	(0.080)	-0.049	(0.393)
Verbal ability at 16 (3^{rd} quintile)	-0.100	(0.073)	-0.052	(0.365)	-0.109	(0.794)
Verbal ability at 16 (2^{nd} quintile)	0.005	(0.069)	0.029	(0.250)	-0.020	(0.188)
Type of school attended:						
Secondary Modern	0.025	(0.045)	0.019	(0.168)	0.006	(0.070)
Grammar School	-0.032	(0.063)	-0.047	(0.361)	-0.036	(0.297)
Private School	-0.016	(0.079)	-0.067	(0.488)	-0.060	(0.475)
Other School	-0.057	(0.136)	-0.032	(0.274)	0.027	(0.274)
Current region of residence:						
North	0.012	(0.096)	0.046	(0.386)	0.055	(0.523)
North West	-0.063	(0.094)	-0.057	(0.368)	-0.075	(0.558)
Yorkshire & Humberside	-0.083	(0.096)	-0.084	(0.503)	-0.125	(0.842)
West Midlands	0.172**	(0.014)	0.144**	(1.486)	0.142*	(1.583)
East Midlands	-0.036	(0.109)	-0.007	(0.116)	-0.039	(0.319)
East Anglia	-0.155	(0.125)	-0.129	(0.619)	-0.144	(0.877)
South West	0.002	(0.094)	-0.018	(0.156)	-0.054	(0.422)
South East	-0.124	(0.082)	-0.089	(0.568)	-0.111	(0.845)
Wales	-0.168*	(0.103)	-0.147	(0.769)	-0.142	(0.973)
Adult skills:						
Adult Numeracy skills-average (Level 1)	0.033	(0.040)	0.026	(0.217)	0.013	(0.125)
Adult Numeracy skills-good (Level 2+)	0.045	(0.046)	0.035	(0.303)	0.006	(0.071)
Adult Literacy skills-average (Level 1)	-0.012	(0.046)	-0.013	(0.112)	-0.050	(0.423)
Adult Literacy skills-good (Level 2+)	0.014	(0.051)	0.012	(0.107)	-0.036	(0.312)
Attitude variables (self-reported):						
I don't help the teacher			-0.049	(0.372)	-0.072	(0.556)
I don't like school			-0.072	(0.536)	-0.073	(0.603)
I don't get on with my work			0.026	(0.212)	0.009	(0.094)
Difficult to keep my mind on work			-0.008	(0.072)	0.015	(0.141)
Homework is a bore			0.023	(0.187)	0.028	(0.261)
I never take work seriously			-0.032	(0.235)	-0.041	(0.347)

There's no point planning for the future	0.138***	(1.413)	0.144***	(1.537)
School as waste of time	-0.025	(0.434)	-0.072	(0.397)
Parental view:				
Bullies other children	0.048	(0.434)	0.041	(0.533)
Not liked by other children	-0.068	(0.498)	-0.069	(1.073)
Destroys property	-0.211	(1.076)	-0.181	(0.075)
Fights with other children	-0.028	(0.223)	-0.006	(0.295)
Tends to be on own	-0.031	(0.252)	-0.035	(0.191)
School view:				
Proportion of half days absent	-0.081	(0.673)	0.016	(0.191)
Bullies other children	-0.010	(0.155)	-0.081	(0.609)
Child cautious 5-scale	-0.011	(0.096)	-0.012	(0.104)
Child lazy 5-scale	0.022	(0.178)	0.032	(0.282)
Child moody 5-scale	-0.004	(0.036)	-0.007	(0.062)
Not liked by other children	-0.023	(0.191)	-0.010	(0.104)
Child unflexible 5-scale	-0.045*	(0.368)	-0.047*	(0.407)
Child timid 5-scale	-0.025	(0.206)	-0.014	(0.125)
Child unsociable 5-scale	-0.011	(0.089)	-0.011	(0.094)
Destroys property	-	-	-	-
Fights with other children	0.064	(0.596)	0.112	(0.386)
Tends to be on own	-0.058	(0.436)	-0.047	(0.581)
Adult Soft Skills:				
Usually achieves in life	-0.025	(0.218)	-0.022	(0.198)
Argues a lot	0.050	(0.452)	0.072	(0.714)
Good caring skills	-0.047	(0.390)	-0.052*	(0.461)
Feels life is under their control	-0.104*	(1.019)	-0.114**	(1.200)
Trusts most people	0.046	(0.355)	0.042	(0.351)
Gets on very well with people	0.038	(0.302)	0.041	(0.353)
Level of qualification:				
NVQ Level 1 or equivalent			0.139***	(1.494)
NVQ Level 2 or equivalent			0.230***	(2.019)
NVQ Level 3 or equivalent			0.188***	(2.203)
NVQ Level 4 or equivalent			0.186***	(2.246)
NVQ Level 5 or equivalent			0.234***	(2.674)
Age 7 ability:				
Math ability at 7 (2^{nd} quintile)			-0.010	(0.097)
Math ability at 7 (3^{rd} quintile)			-0.022	(0.192)
Math ability at 7 (4^{th} quintile)			0.040	(0.364)
Math ability at 7 (5^{th} quintile)			-0.006	(0.082)
Verbal ability at 7 (2^{nd} quintile)			0.044	(0.412)
Verbal ability at 7 (3^{rd} quintile)			0.036	(0.333)
Verbal ability at 7 (4^{th} quintile)			-0.095	(0.731)
Verbal ability at 7 (5^{th} quintile)			-0.060	(0.486)
Observations	858	848	848	

Marginal effects dF/dx reported.
Where appropriate, missing value dummy variables are included for each variable.
Standard errors in parentheses
* significant at 10% level; ** significant at 5% level; *** significant at 1% level

Table A8: 1991 wages and age 16 reading and mathematics tests for males: dependent variable log hourly wage

	(1)		(2)		(3)	
Family background:						
Father's years of education	0.019***	(0.005)	0.018***	(0.005)	0.013**	(0.005)
Mother's years of education	-0.008	(0.007)	-0.005	(0.007)	-0.009	(0.007)
Bad financial situation dummy (childhood)	-0.056***	(0.019)	-0.042**	(0.019)	-0.019	(0.019)
Parental occupation:						
Intermediate	0.032	(0.027)	0.040	(0.027)	0.037	(0.026)
Skilled non-manual	0.067**	(0.033)	0.079**	(0.033)	0.081***	(0.031)
Skilled manual	-0.005	(0.024)	0.005	(0.025)	0.013	(0.024)
Semi-skilled non-man	0.075	(0.094)	0.081	(0.093)	0.125	(0.089)
Semi-skilled manual	-0.042	(0.029)	-0.027	(0.030)	-0.002	(0.028)
Parental interest:						
Father expects too much	0.037	(0.060)	0.032	(0.044)	0.013	(0.044)
Very interested	0.012	(0.023)	0.043	(0.025)	0.022	(0.023)
Some interest	0.014	(0.018)	0.031	(0.019)	-0.011	(0.019)
Mother expects too much	0.031	(0.044)	0.033	(0.060)	-0.009	(0.058)
Very interested	0.049**	(0.024)	0.011*	(0.023)	-0.004	(0.022)
Some interest	0.030	(0.019)	0.003	(0.017)	0.021	(0.017)
Test scores:						
Bristol Social Aptitude Guide (total score at 7)	-0.005***	(0.001)	-0.004***	(0.001)	-0.002**	(0.001)
Math ability at 16 (5^{th} quintile)	0.203***	(0.032)	0.176***	(0.033)	0.038	(0.033)
Math ability at 16 (4^{th} quintile)	0.110***	(0.030)	0.093***	(0.030)	0.014	(0.030)
Math ability at 16 (3^{rd} quintile)	0.058**	(0.028)	0.047*	(0.029)	0.006	(0.028)
Math ability at 16 (2^{nd} quintile)	0.003	(0.029)	0.005	(0.030)	-0.006	(0.029)
Verbal ability at 16 (5^{th} quintile)	0.198***	(0.031)	0.182***	(0.031)	0.074**	(0.031)
Verbal ability at 16 (4^{th} quintile)	0.173***	(0.028)	0.155***	(0.029)	0.067**	(0.029)
Verbal ability at 16 (3^{rd} quintile)	0.096***	(0.028)	0.077***	(0.028)	0.024	(0.028)
Verbal ability at 16 (2^{nd} quintile)	0.075***	(0.028)	0.062**	(0.028)	0.017	(0.028)
Type of school attended:						
Secondary Modern	-0.020	(0.019)	-0.020	(0.019)	-0.014	(0.019)
Grammar School	0.000	(0.025)	0.007	(0.025)	-0.010	(0.025)
Private School	0.089**	(0.036)	0.084**	(0.035)	0.081**	(0.034)
Other School	-0.068	(0.056)	-0.039	(0.055)	-0.014	(0.053)
Current region of residence:						
North	-0.197***	(0.037)	-0.206***	(0.036)	-0.215***	(0.034)
North West	-0.189***	(0.032)	-0.195***	(0.032)	-0.192***	(0.030)
Yorkshire & Humberside	-0.216***	(0.033)	-0.219***	(0.033)	-0.221***	(0.031)
West Midlands	-0.196***	(0.033)	-0.200***	(0.032)	-0.199***	(0.030)
East Midlands	-0.164***	(0.034)	-0.169***	(0.033)	-0.155***	(0.032)
East Anglia	-0.125***	(0.039)	-0.121***	(0.039)	-0.127***	(0.037)
South West	-0.157***	(0.036)	-0.161***	(0.036)	-0.164***	(0.035)
South East	0.015	(0.030)	0.009	(0.029)	0.010	(0.028)
Wales	-0.214***	(0.039)	-0.218***	(0.039)	-0.213***	(0.037)
Scotland	-0.212***	(0.034)	-0.216***	(0.033)	-0.220***	(0.031)
Attitude variables (self-reported):						
I don't help the teacher			0.000	(0.018)	-0.004	(0.017)
I don't like school			-0.008	(0.020)	-0.005	(0.019)
I don't get on with my work			-0.001	(0.018)	-0.001	(0.017)
Difficult to keep my mind on work			0.013	(0.017)	0.030*	(0.016)
Homework is a bore			-0.025	(0.016)	-0.013	(0.016)
I never take work seriously			-0.055**	(0.026)	-0.034	(0.026)
There's no point planning for the future			-0.006	(0.021)	-0.007	(0.021)

School as waste of time			-0.029	(0.028)	-0.021	(0.027)
Parental view:						
Bullies other children			-0.014	(0.038)	0.023	(0.036)
Not liked by other children			-0.045	(0.033)	-0.029	(0.033)
Destroys property			-0.064	(0.047)	-0.041	(0.047)
Fights with other children			-0.002	(0.027)	-0.002	(0.026)
Tends to be on own			-0.024	(0.015)	-0.032**	(0.014)
School view:						
Proportion of half days absent			-0.099*	(0.056)	-0.037	(0.055)
Bullies other children			0.039	(0.044)	0.040	(0.044)
Child cautious 5-scale			-0.033***	(0.010)	-0.029***	(0.010)
Child lazy 5-scale			-0.009	(0.008)	0.001	(0.008)
Child moody 5-scale			-0.006	(0.008)	-0.008	(0.008)
Not liked by other children			-0.009	(0.025)	-0.018	(0.024)
Child unflexible 5-scale			0.004	(0.010)	0.011	(0.010)
Child timid 5-scale			-0.033***	(0.012)	-0.026**	(0.012)
Child unsociable 5-scale			-0.016*	(0.009)	-0.017*	(0.009)
Destroys property			0.012	(0.039)	0.014	(0.039)
Fights with other children			-0.057	(0.041)	-0.039	(0.040)
Tends to be on own			-0.045**	(0.019)	-0.034*	(0.018)
Level of qualification:						
NVQ Level 1 or equivalent					0.041	(0.029)
NVQ Level 2 or equivalent					0.158***	(0.026)
NVQ Level 3 or equivalent					0.216***	(0.028)
NVQ Level 4 or equivalent					0.346***	(0.035)
NVQ Level 5 or equivalent					0.429***	(0.031)
Age 7 ability:						
Math ability at 7 (2^{nd} quintile)					0.029	(0.022)
Math ability at 7 (3^{rd} quintile)					0.057***	(0.022)
Math ability at 7 (4^{th} quintile)					0.055**	(0.022)
Math ability at 7 (5^{th} quintile)					0.109***	(0.024)
Verbal ability at 7 (2^{nd} quintile)					0.039*	(0.021)
Verbal ability at 7 (3^{rd} quintile)					0.023	(0.022)
Verbal ability at 7 (4^{th} quintile)					0.026	(0.024)
Verbal ability at 7 (5^{th} quintile)					0.021	(0.026)
Constant	1.841***	(0.086)	2.176***	(0.106)	2.005***	(0.101)
Observations	3293		3293		3293	
R-squared	0.23		0.26		0.34	

Where appropriate, missing value dummy variables are included for each variable.
Robust standard errors in parentheses
* significant at 10% level; ** significant at 5% level; *** significant at 1% level

Table A9: 1991 wages and age 16 reading and mathematics tests for females: dependent variable log hourly wage

	(1)		(2)		(3)	
Family background:						
Father's years of education	0.007	(0.006)	0.007	(0.006)	0.003	(0.006)
Mother's years of education	0.003	(0.007)	0.000	(0.007)	-0.014*	(0.007)
Bad financial situation dummy (childhood)	-0.065***	(0.021)	-0.046**	(0.022)	-0.030	(0.020)
Parental occupation:						
Intermediate	-0.033	(0.033)	-0.030	(0.033)	-0.035	(0.031)
Skilled non-manual	-0.048	(0.039)	-0.043	(0.039)	-0.027	(0.036)
Skilled manual	-0.069**	(0.028)	-0.060**	(0.028)	-0.044*	(0.026)
Semi-skilled non-man	-0.136	(0.077)	-0.126	(0.081)	-0.077	(0.078)
Semi-skilled manual	-0.082**	(0.034)	-0.075**	(0.035)	-0.051	(0.032)
Parental interest:						
Father expects too much	0.003	(0.111)	0.080	(0.111)	0.043	(0.107)
Very interested	0.030	(0.026)	0.080	(0.026)	0.026	(0.024)
Some interest	-0.022	(0.022)	0.050	(0.022)	0.035*	(0.021)
Mother expects too much	0.093	(0.061)	-0.020	(0.062)	-0.049	(0.058)
Very interested	0.094***	(0.027)	0.038***	(0.027)	0.015	(0.026)
Some interest	0.053**	(0.023)	-0.021**	(0.023)	-0.038	(0.021)
Test scores:						
Bristol Social Aptitude Guide (total score at 7)	-0.005***	(0.001)	-0.005***	(0.001)	-0.003**	(0.001)
Math ability at 16 (5^{th} quintile)	0.250***	(0.039)	0.190***	(0.040)	0.064*	(0.038)
Math ability at 16 (4^{th} quintile)	0.135***	(0.035)	0.093***	(0.035)	0.031	(0.034)
Math ability at 16 (3^{rd} quintile)	0.038	(0.030)	0.014	(0.030)	-0.007	(0.028)
Math ability at 16 (2^{nd} quintile)	0.002	(0.028)	-0.009	(0.027)	-0.012	(0.026)
Verbal ability at 16 (5^{th} quintile)	0.261***	(0.038)	0.222***	(0.039)	0.083**	(0.038)
Verbal ability at 16 (4^{th} quintile)	0.190***	(0.035)	0.150***	(0.036)	0.060*	(0.035)
Verbal ability at 16 (3^{rd} quintile)	0.125***	(0.032)	0.092***	(0.033)	0.024	(0.032)
Verbal ability at 16 (2^{nd} quintile)	0.016	(0.028)	0.000	(0.030)	-0.033	(0.028)
Type of school attended:						
Secondary Modern	-0.045*	(0.024)	-0.053**	(0.024)	-0.043*	(0.022)
Grammar School	-0.009	(0.032)	0.001	(0.032)	-0.041	(0.030)
Private School	0.067	(0.044)	0.067	(0.045)	0.009	(0.043)
Other School	-0.045	(0.062)	-0.024	(0.064)	0.024	(0.059)
Current region of residence:						
North	-0.340***	(0.046)	-0.345***	(0.046)	-0.289***	(0.043)
North West	-0.228***	(0.040)	-0.233***	(0.040)	-0.209***	(0.036)
Yorkshire & Humberside	-0.312***	(0.039)	-0.322***	(0.039)	-0.292***	(0.036)
West Midlands	-0.262***	(0.041)	-0.271***	(0.041)	-0.233***	(0.037)
East Midlands	-0.305***	(0.045)	-0.315***	(0.045)	-0.263***	(0.041)
East Anglia	-0.298***	(0.048)	-0.307***	(0.048)	-0.246***	(0.046)
South West	-0.357***	(0.042)	-0.361***	(0.042)	-0.293***	(0.038)
South East	-0.169***	(0.037)	-0.174***	(0.037)	-0.138***	(0.035)
Wales	-0.287***	(0.048)	-0.295***	(0.048)	-0.259***	(0.044)
Scotland	-0.272***	(0.041)	-0.280***	(0.041)	-0.288***	(0.037)
Attitude variables (self-reported):						
I don't help the teacher			-0.005	(0.024)	-0.018	(0.023)
I don't like school			-0.008	(0.024)	0.020	(0.023)
I don't get on with my work			-0.007	(0.024)	0.012	(0.022)
Difficult to keep my mind on work			-0.032	(0.023)	-0.013	(0.021)
Homework is a bore			-0.041*	(0.021)	-0.022	(0.020)
I never take work seriously			0.004	(0.031)	-0.002	(0.030)
There's no point planning for the future			-0.066***	(0.024)	-0.064***	(0.023)

School as waste of time			-0.041	(0.038)	-0.034	(0.035)
Parental view:						
Bullies other children			-0.049	(0.047)	-0.027	(0.045)
Not liked by other children			-0.095	(0.060)	-0.065	(0.054)
Destroys property			0.049	(0.129)	-0.029	(0.118)
Fights with other children			-0.021	(0.029)	-0.017	(0.028)
Tends to be on own			-0.011	(0.020)	-0.004	(0.018)
School view:						
Proportion of half days absent			-0.129*	(0.070)	-0.015	(0.064)
Bullies other children			-0.055	(0.066)	-0.025	(0.061)
Child cautious 5-scale			-0.004	(0.013)	-0.001	(0.012)
Child lazy 5-scale			-0.031***	(0.011)	-0.012	(0.011)
Child moody 5-scale			0.012	(0.010)	0.011	(0.009)
Not liked by other children			0.010	(0.039)	0.011	(0.038)
Child unflexible 5-scale			0.003	(0.013)	0.009	(0.012)
Child timid 5-scale			-0.024	(0.015)	-0.012	(0.014)
Child unsociable 5-scale			-0.019*	(0.011)	-0.018*	(0.010)
Destroys property			0.089	(0.063)	0.065	(0.063)
Fights with other children			-0.066	(0.048)	-0.056	(0.046)
Tends to be on own			0.000	(0.027)	0.002	(0.024)
Level of qualification:						
NVQ Level 1 or equivalent					0.090***	(0.028)
NVQ Level 2 or equivalent					0.165***	(0.027)
NVQ Level 3 or equivalent					0.281***	(0.038)
NVQ Level 4 or equivalent					0.475***	(0.037)
NVQ Level 5 or equivalent					0.642***	(0.034)
Age 7 ability:						
Math ability at 7 (2^{nd} quintile)					-0.025	(0.025)
Math ability at 7 (3^{rd} quintile)					-0.039	(0.027)
Math ability at 7 (4^{th} quintile)					-0.020	(0.027)
Math ability at 7 (5^{th} quintile)					0.003	(0.030)
Verbal ability at 7 (2^{nd} quintile)					0.054**	(0.026)
Verbal ability at 7 (3^{rd} quintile)					0.069**	(0.028)
Verbal ability at 7 (4^{th} quintile)					0.075**	(0.030)
Verbal ability at 7 (5^{th} quintile)					0.081***	(0.030)
Constant	1.652***	(0.094)	1.985***	(0.122)	1.780***	(0.124)
Observations	2866		2866		2866	
R-squared	0.24		0.26		0.38	

Where appropriate, missing value dummy variables are included for each variable.
Robust standard errors in parentheses
* significant at 10% level; ** significant at 5% level; *** significant at 1% level

Table A10: 1991 wages and adult literacy/numeracy for males: dependent variable log hourly wage

	(1)		(2)		(3)	
Family background:						
Father's years of education	0.020	(0.017)	0.029*	(0.016)	0.024	(0.016)
Mother's years of education	-0.015	(0.019)	-0.019	(0.019)	-0.030	(0.019)
Bad financial situation dummy (childhood)	-0.004	(0.051)	0.012	(0.054)	0.006	(0.051)
Parental occupation:						
Intermediate	0.044	(0.065)	0.032	(0.074)	0.010	(0.070)
Skilled non-manual	-0.008	(0.086)	-0.030	(0.100)	-0.060	(0.096)
Skilled manual	0.039	(0.063)	0.026	(0.072)	0.030	(0.067)
Semi-skilled non-man	-0.145	(0.097)	-0.184	(0.153)	-0.083	(0.153)
Semi-skilled manual	-0.044	(0.082)	-0.043	(0.091)	-0.025	(0.083)
Parental interest:						
Father expects too much	0.087	(0.176)	0.088	(0.213)	-0.011	(0.214)
Very interested	0.016	(0.061)	0.098	(0.067)	-0.023	(0.067)
Some interest	-0.028	(0.045)	-0.005	(0.050)	0.038	(0.062)
Mother expects too much	-0.068	(0.108)	-0.021	(0.116)	0.038	(0.104)
Very interested	0.077	(0.065)	-0.008	(0.072)	0.115*	(0.062)
Some interest	0.068	(0.056)	0.049	(0.063)	0.032	(0.051)
Test scores:						
Bristol Social Aptitude Guide (total score at 7)	-0.005**	(0.002)	-0.004*	(0.002)	-0.003	(0.002)
Math ability at 16 (5^{th} quintile)	0.216**	(0.089)	0.229**	(0.097)	0.139	(0.094)
Math ability at 16 (4^{th} quintile)	0.151	(0.088)	0.172*	(0.092)	0.133	(0.091)
Math ability at 16 (3^{rd} quintile)	0.085	(0.085)	0.095	(0.089)	0.064	(0.082)
Math ability at 16 (2^{nd} quintile)	0.001	(0.071)	-0.016	(0.086)	-0.001	(0.082)
Verbal ability at 16 (5^{th} quintile)	-0.031	(0.071)	-0.073	(0.083)	-0.078	(0.087)
Verbal ability at 16 (4^{th} quintile)	-0.006	(0.064)	-0.057	(0.077)	-0.065	(0.081)
Verbal ability at 16 (3^{rd} quintile)	-0.060	(0.072)	-0.148*	(0.078)	-0.113	(0.078)
Verbal ability at 16 (2^{nd} quintile)	-0.029	(0.072)	-0.104	(0.078)	-0.076	(0.082)
Type of school attended:						
Secondary Modern	-0.037	(0.046)	-0.049	(0.047)	-0.038	(0.048)
Grammar School	0.043	(0.065)	0.038	(0.065)	0.060	(0.065)
Private School	0.236*	(0.127)	0.137	(0.131)	0.224*	(0.125)
Other School	0.075	(0.110)	0.030	(0.115)	0.067	(0.129)
Current region of residence:						
North	-0.195*	(0.104)	-0.201*	(0.121)	-0.173	(0.116)
North West	-0.102	(0.099)	-0.148	(0.114)	-0.104	(0.107)
Yorkshire & Humberside	-0.151	(0.113)	-0.146	(0.127)	-0.093	(0.119)
West Midlands	-0.178*	(0.105)	-0.179	(0.124)	-0.112	(0.119)
East Midlands	-0.113	(0.099)	-0.121	(0.116)	-0.077	(0.110)
East Anglia	-0.116	(0.121)	-0.073	(0.138)	-0.007	(0.128)
South West	-0.094	(0.116)	0.006	(0.133)	0.019	(0.129)
South East	0.059	(0.093)	0.066	(0.107)	0.116	(0.102)
Wales	-0.254**	(0.121)	-0.307**	(0.144)	-0.222*	(0.124)
Scotland	-0.005	(0.165)	0.064	(0.131)	0.068	(0.136)
Adult skills:						
Adult Numeracy skills-average (Level 1)	0.091*	(0.053)	0.097*	(0.058)	0.086	(0.055)
Adult Numeracy skills-good (Level 2+)	0.126**	(0.054)	0.109*	(0.056)	0.048	(0.055)
Adult Literacy skills-avg (Level 1)	-0.004	(0.058)	-0.007	(0.063)	-0.002	(0.065)
Adult Literacy skills-good (Level 2+)	0.068	(0.062)	0.064	(0.067)	0.065	(0.071)
Attitude variables (self-reported):						

I don’t help the teacher			0.028	(0.046)	0.023	(0.045)
I don't like school			0.005	(0.054)	-0.012	(0.051)
I don't get on with my work			0.055	(0.056)	0.043	(0.055)
Difficult to keep my mind on work			-0.031	(0.044)	-0.020	(0.041)
Homework is a bore			0.026	(0.046)	0.053	(0.045)
I never take work seriously			-0.039	(0.084)	-0.022	(0.091)
There’s no point planning for the future			-0.047	(0.067)	-0.051	(0.070)
School as waste of time			-0.053	(0.086)	-0.036	(0.091)
Parental view:						
Bullies other children			-0.243**	(0.113)	-0.168	(0.104)
Not liked by other children			-0.002	(0.093)	-0.052	(0.101)
Destroys property			0.026	(0.139)	-0.005	(0.138)
Fights with other children			-0.125	(0.088)	-0.139*	(0.079)
Tends to be on own			0.033	(0.048)	0.023	(0.045)
School view:						
Proportion of half days absent			-0.291	(0.302)	-0.345	(0.300)
Bullies other children			0.010	(0.138)	0.005	(0.125)
Child cautious 5-scale			-0.050	(0.032)	-0.056*	(0.033)
Child lazy 5-scale			0.028	(0.025)	0.052**	(0.024)
Child moody 5-scale			-0.020	(0.024)	-0.038	(0.024)
Not liked by other children			0.048	(0.065)	0.020	(0.067)
Child unflexible 5-scale			-0.012	(0.033)	-0.001	(0.035)
Child timid 5-scale			-0.046	(0.038)	-0.029	(0.039)
Child unsociable 5-scale			-0.014	(0.026)	-0.012	(0.026)
Destroys property			0.004	(0.104)	0.080	(0.101)
Fights with other children			-0.032	(0.153)	0.005	(0.139)
Tends to be on own			-0.015	(0.056)	0.010	(0.054)
Adult Soft Skills:						
Usually achieves in life			0.056	(0.062)	0.032	(0.061)
Argues a lot			0.015	(0.096)	0.045	(0.082)
Good caring skills			-0.010	(0.051)	-0.061	(0.050)
Feels life is under their control			0.041	(0.081)	0.010	(0.079)
Trusts most people			0.005	(0.047)	0.030	(0.046)
Gets on very well with people			0.086**	(0.043)	0.098**	(0.042)
Level of qualification:						
NVQ Level 1 or equivalent					0.000	(0.090)
NVQ Level 2 or equivalent					0.095	(0.090)
NVQ Level 3 or equivalent					0.213**	(0.101)
NVQ Level 4 or equivalent					0.401***	(0.107)
NVQ Level 5 or equivalent					0.355***	(0.102)
Age 7 ability:						
Math ability at 7 (2^{nd} quintile)					0.015	(0.070)
Math ability at 7 (3^{rd} quintile)					-0.020	(0.077)
Math ability at 7 (4^{th} quintile)					0.123*	(0.070)
Math ability at 7 (5^{th} quintile)					0.094	(0.078)
Verbal ability at 7 (2^{nd} quintile)					-0.075	(0.067)
Verbal ability at 7 (3^{rd} quintile)					-0.051	(0.064)
Verbal ability at 7 (4^{th} quintile)					-0.148**	(0.065)
Verbal ability at 7 (5^{th} quintile)					-0.128*	(0.073)
Constant	1.865***	(0.221)	2.100***	(0.290)	2.012***	(0.271)
Observations	442		442		442	
R-squared	0.31		0.42		0.49	

Where appropriate, missing value dummy variables are included for each variable.
Robust standard errors in parentheses
* significant at 10% level; ** significant at 5% level; *** significant at 1% level

Table A11: 1991 wages and adult literacy/numeracy for females: dependent variable log hourly wage

	(1)		(2)		(3)	
Family background:						
Father's years of education	0.015	(0.016)	0.014	(0.017)	0.011	(0.016)
Mother's years of education	-0.005	(0.020)	-0.009	(0.020)	-0.011	(0.019)
Bad financial situation dummy (childhood)	-0.016	(0.066)	0.028	(0.070)	0.064	(0.065)
Parental occupation:						
Intermediate	-0.047	(0.072)	-0.085	(0.079)	-0.042	(0.074)
Skilled non-manual	0.090	(0.100)	0.108	(0.110)	0.122	(0.106)
Skilled manual	-0.021	(0.073)	-0.029	(0.081)	0.020	(0.077)
Semi-skilled non-man	-0.467**	(0.210)	-0.424	(0.282)	-0.308	(0.313)
Semi-skilled manual	0.083	(0.091)	0.034	(0.105)	0.073	(0.100)
Parental interest:						
Father expects too much	0.064	(0.279)	0.285	(0.190)	0.271	(0.252)
Very interested	0.089	(0.064)	0.137*	(0.072)	0.115*	(0.068)
Some interest	-0.048	(0.063)	-0.020	(0.069)	-0.030	(0.069)
Mother expects too much	0.203	(0.171)	0.014	(0.282)	0.057	(0.191)
Very interested	0.093	(0.078)	0.052	(0.081)	0.061	(0.078)
Some interest	0.018	(0.071)	-0.006	(0.074)	0.042	(0.064)
Test scores:						
Bristol Social Aptitude Guide (total score at 7)	-0.005	(0.003)	-0.007**	(0.003)	-0.005*	(0.003)
Math ability at 16 (5^{th} quintile)	0.085	(0.123)	-0.036	(0.134)	-0.141	(0.121)
Math ability at 16 (4^{th} quintile)	-0.081	(0.113)	-0.145	(0.116)	-0.128	(0.108)
Math ability at 16 (3^{rd} quintile)	-0.058	(0.108)	-0.130	(0.108)	-0.084	(0.097)
Math ability at 16 (2^{nd} quintile)	0.012	(0.102)	-0.092	(0.100)	-0.076	(0.089)
Verbal ability at 16 (5^{th} quintile)	0.356***	(0.110)	0.313***	(0.119)	0.233**	(0.109)
Verbal ability at 16 (4^{th} quintile)	0.159	(0.097)	0.086	(0.105)	0.071	(0.102)
Verbal ability at 16 (3^{rd} quintile)	0.224**	(0.104)	0.185*	(0.104)	0.181*	(0.098)
Verbal ability at 16 (2^{nd} quintile)	0.109	(0.100)	0.059	(0.104)	0.053	(0.104)
Type of school attended:						
Secondary Modern	0.038	(0.064)	-0.018	(0.073)	-0.023	(0.068)
Grammar School	0.080	(0.092)	0.043	(0.096)	-0.028	(0.090)
Private School	-0.059	(0.098)	-0.075	(0.113)	-0.069	(0.095)
Other School	-0.015	(0.108)	0.013	(0.128)	0.212*	(0.122)
Current region of residence:						
North	-0.260*	(0.142)	-0.335**	(0.146)	-0.355***	(0.129)
North West	-0.260**	(0.129)	-0.257*	(0.140)	-0.284**	(0.118)
Yorkshire & Humberside	-0.113	(0.129)	-0.170	(0.135)	-0.276**	(0.114)
West Midlands	-0.303**	(0.136)	-0.349**	(0.144)	-0.357***	(0.125)
East Midlands	-0.109	(0.142)	-0.125	(0.150)	-0.143	(0.142)
East Anglia	-0.237	(0.161)	-0.205	(0.166)	-0.209	(0.142)
South West	-0.313**	(0.139)	-0.353**	(0.149)	-0.361***	(0.124)
South East	-0.149	(0.127)	-0.179	(0.130)	-0.174	(0.110)
Wales	-0.139	(0.135)	-0.205	(0.157)	-0.228*	(0.130)
Scotland	-	-	-	-	-	-
Adult skills:						
Adult Numeracy skills-average (Level 1)	0.095	(0.058)	0.069	(0.067)	0.040	(0.065)
Adult Numeracy skills-good (Level 2+)	0.186***	(0.072)	0.114	(0.078)	0.017	(0.071)
Adult Literacy skills-avg (Level 1)	0.050	(0.064)	0.096	(0.073)	0.039	(0.069)
Adult Literacy skills-good (Level 2+)	0.153**	(0.071)	0.196**	(0.078)	0.090	(0.075)
Attitude variables (self-reported):						

I don't help the teacher			-0.032	(0.066)	-0.049	(0.063)
I don't like school			-0.103*	(0.062)	-0.056	(0.061)
I don't get on with my work			-0.139**	(0.070)	-0.127*	(0.069)
Difficult to keep my mind on work			0.089	(0.067)	0.126**	(0.060)
Homework is a bore			-0.026	(0.072)	0.002	(0.067)
I never take work seriously			0.237***	(0.090)	0.197**	(0.084)
There's no point planning for the future			-0.150**	(0.071)	-0.171**	(0.069)
School as waste of time			-0.239**	(0.107)	-0.240**	(0.111)
Parental view:						
Bullies other children			-0.154	(0.157)	-0.170	(0.157)
Not liked by other children			0.170	(0.153)	0.192	(0.127)
Destroys property			-0.050	(0.184)	-0.045	(0.189)
Fights with other children			0.155	(0.112)	0.169	(0.106)
Tends to be on own			0.074	(0.057)	0.060	(0.054)
School view:						
Proportion of half days absent			-0.065	(0.187)	-0.141	(0.182)
Bullies other children			-0.094	(0.208)	-0.120	(0.201)
Child cautious 5-scale			0.003	(0.037)	0.020	(0.034)
Child lazy 5-scale			-0.023	(0.033)	-0.011	(0.032)
Child moody 5-scale			0.037	(0.031)	0.028	(0.030)
Not liked by other children			-0.203*	(0.121)	-0.134	(0.111)
Child unflexible 5-scale			0.026	(0.037)	0.038	(0.035)
Child timid 5-scale			0.000	(0.047)	-0.006	(0.045)
Child unsociable 5-scale			-0.021	(0.037)	-0.031	(0.036)
Destroys property			0.548***	(0.161)	0.438***	(0.163)
Fights with other children			-0.122	(0.181)	-0.072	(0.161)
Tends to be on own			0.058	(0.082)	0.044	(0.074)
Adult Soft Skills:						
Usually achieves in life			0.036	(0.069)	0.045	(0.064)
Argues a lot			0.234**	(0.110)	0.207**	(0.093)
Good caring skills			0.025	(0.047)	-0.028	(0.046)
Feels life is under their control			0.096	(0.089)	0.030	(0.089)
Trusts most people			0.055	(0.063)	0.045	(0.058)
Gets on very well with people			0.055	(0.051)	0.089*	(0.049)
Level of qualification:						
NVQ Level 1 or equivalent					0.129	(0.093)
NVQ Level 2 or equivalent					0.096	(0.081)
NVQ Level 3 or equivalent					0.254**	(0.101)
NVQ Level 4 or equivalent					0.373***	(0.121)
NVQ Level 5 or equivalent					0.583***	(0.094)
Age 7 ability:						
Math ability at 7 (2^{nd} quintile)					-0.049	(0.070)
Math ability at 7 (3^{rd} quintile)					-0.033	(0.078)
Math ability at 7 (4^{th} quintile)					-0.009	(0.075)
Math ability at 7 (5^{th} quintile)					0.157*	(0.086)
Verbal ability at 7 (2^{nd} quintile)					-0.007	(0.091)
Verbal ability at 7 (3^{rd} quintile)					0.012	(0.079)
Verbal ability at 7 (4^{th} quintile)					0.051	(0.086)
Verbal ability at 7 (5^{th} quintile)					-0.003	(0.089)
Constant	1.438***	(0.255)	1.421***	(0.362)	1.285***	(0.340)
Observations	412		412		412	
R-squared	0.32		0.44		0.54	

Where appropriate, missing value dummy variables are included for each variable.
Robust standard errors in parentheses
* significant at 10% level; ** significant at 5% level; *** significant at 1% level